



USER MANUAL

JEROME® J405 MERCURY VAPOR ANALYZER

July 2014

Firmware Version 1.34

ARIZONA INSTRUMENT LLC

3375 N Delaware Street | Chandler, AZ 85225 USA
800.528.7411 | 602.470.1414 | f 602.281.1745

www.azic.com

Email:

General – azi@azic.com

International – intl@azic.com

Customer Service – support@azic.com

JEROME® J405 Mercury Vapor Analyzer Operation Manual



PROPRIETARY RIGHTS NOTICE

This manual contains valuable information and material developed by Arizona Instrument LLC for use with the Jerome® J405 Mercury Vapor Analyzer. No part of this manual can be reproduced or transmitted in any form or by any means, electronic, mechanical or otherwise. This includes photocopying and recording or in connection with any information storage or retrieval system without the express written permission of Arizona Instrument LLC.

ALL RIGHTS RESERVED

© Copyright 2006-2014 Arizona Instrument LLC

Resisorb® is a registered trademark of Avantor Performance Materials.

Tygon® is a registered trademark of Saint-Gobain Performance Plastics Corporation.

Sofnolime™ is a trademark of Molecular Products Limited.

Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

Table of Contents

1. UNPACKING THE INSTRUMENT.....	5
2. INTRODUCTION.....	7
3. JEROME® J405 TECHNICAL SPECIFICATIONS.....	9
4. PRINCIPLE OF OPERATION	10
Zero Air Filter (AZI P/N Z2600 3905)	11
5. INSTRUMENT OPERATION.....	12
J405 Main Screen Display	12
J405 Back Panel Connections.....	13
J405 User Interface Main Menu Structure.....	14
SAMPLE menu	15
REGEN menu	17
DATA menu.....	18
SYSTEM menu.....	20
Daily Operations	22
Sensor Regeneration	23
Sample Mode	24
Survey Mode.....	25
Operating on AC Power or Generator	26
Operating on Internal Battery Power	26
Battery Management.....	26
External Battery Power	27
Charging Internal Battery	28
Retrieving Data	29
Instrument I/O Interface.....	30
4-20mA Output	30
6. MAINTENANCE	32
Preventive Maintenance Schedule	32
Flow System	33
.25 inch Fritware Filter	33
AG Filter Check.....	34
Internal Filters.....	35
Replacing the Battery Pack.....	36
7. CALIBRATION	37
Factory Calibration Service	37
Verification of Functionality.....	37
8. J405 TROUBLESHOOTING.....	38
Potential Interferences	41
9. ACCESSORIES & MAINTENANCE PARTS.....	42
Spare Parts and Accessories.....	43
10. APPENDIX A – USB/HYPERTERMINAL SETUP.....	47
11. APPENDIX B – J405 FUNCTIONAL TEST KIT	57
Preparation	57
Mercury Transfer	58
Replacing Mercury.....	58
Syringe Technique	59

Functional Test Procedure.....	60
J405 FTK Instrument Response Chart	61
Functional Test Troubleshooting.....	62
12. WARRANTY	63

All section numbers, titles and page numbers in **BOLD** in this manual are hyperlinks and can be clicked to simplify navigation within the PDF version of the manual. The BACK button found in most PDF software programs is also very helpful when navigating using the hyperlinks.

An up-to-date electronic copy of this manual can be found at:

<http://www.azic.com/downloads.aspx>

NOTE: For EPA clean-up levels less than 3 µg/m³, it is necessary to run a warm-up routine before sampling. To initiate the automatic five minute warm-up, install a **Zero Air Filter (AZI P/N Z2600 3905)** in the intake and select **Warmup** from the **REGEN menu**.

Refer to the **Daily Operations** section for more information.

1. UNPACKING THE INSTRUMENT

This manual contains details that will optimize the results and the life of your instrument. Read and refer to the manual for complete details on operation, maintenance and troubleshooting, special voltage inputs and data output.

The Jerome® J405 is easy to operate and ready for use upon receipt from the factory.

- Remove the instrument from the packing material.



Retain all packaging materials for any future shipment of the instrument.
If the instrument is returned to AZI for any reason, it must be placed in the original packaging materials that have been tested and proven to be effective protection during shipment.



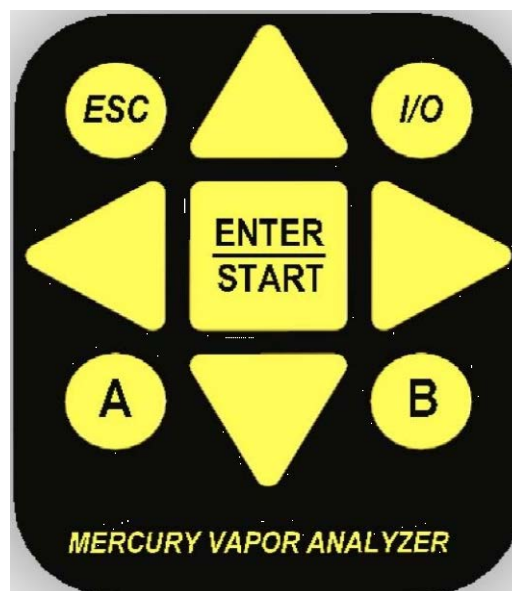
- Call AZI Customer Service at 800-528-7411 or 602-470-1414 or go to the AZI website www.azic.com for Return Material Authorization (RMA) information prior to returning a unit.
- Boxes and packing materials for all shipments are available from AZI.
- Pack the Jerome® instrument only in a Jerome® shipping container.



AZI WILL NOT BE RESPONSIBLE FOR SHIPPING DAMAGE.
IF YOU RETURN THE INSTRUMENT IMPROPERLY PACKAGED OR SHIPPED,
YOU SHOULD INSURE IT FOR FULL VALUE.

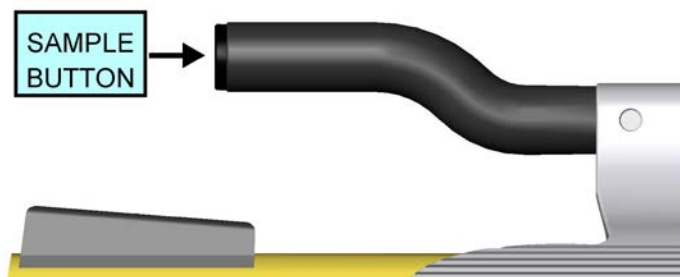


- Check for any damage and confirm receipt of all parts on your packing list. Contact Arizona Instrument Customer Service at (800) 528-7411 or (602) 470-1414 if you have any questions.
- Press the **I/O** button. The display will light up and show instrument serial number and software revision.
 - If necessary, press **ESC** to clear any calibration reminders. Call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com, to schedule instrument calibration.
- The digital meter displays $0.00 \mu\text{g}/\text{m}^3$ (or $0.000 \text{mg}/\text{m}^3$).
- Look at the battery icon in the top center of the display to determine the current battery level.
 - If the battery icon is empty and flashing, recharge the battery. See page 28.



- The included AC power supply/charger can utilize 110V or 220V AC power, and it is not necessary to manually select the input voltage.
- The J405 contains an auto-resetting fuse that does not require care, maintenance or replacement by the user.

- Perform a sensor regeneration by following these steps:
 - Connect the AC power supply/charger between the matching (DIN) connector on the back of the J405 and an AC power outlet or connect the external battery pack to the back of the J405.
 - If the J405 is turned off, press the **I/O** power button to turn the instrument on.
 - Press the RIGHT arrow button (▶) to enter the main menu.
 - Press the DOWN arrow button (▼) to move the cursor to **Regen**.
 - Press the RIGHT arrow button (▶) to select **Regen** from the menu.
 - Press the **ENTER/START** button on the keypad to select **Regen Now** from the Regen menu.
 - The instrument will respond with “Perform Regen Using EXTERNAL POWER?”
 - Press **ENTER/START** to proceed or **ESC** to exit.
 - The instrument display will warn “Do Not Disconnect External Power while Heating”.
 - Press **ENTER/START** to proceed or **ESC** to exit.
 - The instrument will now begin a 45-minute regeneration cycle, indicated by Regeneration in Progress on the display. **Do not interrupt this cycle.** For a complete description of this process, see page 23.
 - If any error message appears on the display, see the “Troubleshooting” section beginning on page 38.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- The instrument is now ready to sample.
- Press the SAMPLE BUTTON at the end of the handle of the J405 to start a 16-second sampling cycle.
- When the instrument measures mercury vapor, the $0.00 \mu\text{g}/\text{m}^3$ (or $0.000 \text{ mg}/\text{m}^3$) display will be replaced with a value.
- To ensure the input to the instrument contains no mercury vapor or mercaptans, use a Zero Air Filter (AZI P/N Z2600 3905). The Zero Air Filter cleans the air sample and should produce sample readings of $0.00 \mu\text{g}/\text{m}^3$ (or $0.000 \text{ mg}/\text{m}^3$). Therefore, use the filter to:
 - Equilibrate the instrument to temperatures that are higher or lower than the instrument. Sample every 15 seconds with the filter installed until the reading is $0.00 \mu\text{g}/\text{m}^3$ (or $0.000 \text{ mg}/\text{m}^3$).
 - Identify contamination within the unit.
 - Confirm the presence of mercury vapor when readings are elevated. Install the filter and verify that the readings decrease with the filter installed.
- The instrument is designed for ambient air monitoring.



WARNING

DO NOT allow the probe or the instrument's intake to be exposed to any liquid. DO NOT obstruct the intake or exhaust ports of the J405, as this could cause errors in readings and damage to the flow control system.

- The instrument is not explosion proof.
 - Perform sensor regeneration before each day's use.
 - Perform another sensor regeneration after each day's use.
 - During periods of storage or inactivity, perform sensor regeneration every 30 days.
- Call AZI Customer Service at (800) 528-7411 or (602) 470-1414 if you have any questions. If you prefer, you may send e-mail to support@azic.com.**

2. INTRODUCTION

The Jerome® J405 Mercury Vapor Analyzer is an ambient air analyzer with a range of 0.5 to 999 micrograms of mercury vapor per cubic meter ($\mu\text{g}/\text{m}^3$ Hg).



CAUTION:

The Jerome® J405 is for gaseous vapor use only.
DO NOT allow the probe or the instrument's intake
to be exposed to any liquid, dust
or other foreign material.



The J405 is designed to be easy to operate for quick and accurate analysis of mercury vapor levels. It has few maintenance requirements. However, please take a moment to read this manual before attempting operation. If you have any questions about your application or operation, please call AZI Customer Service at (800) 528-7411 or (602) 470-1414 or e-mail support@azic.com for assistance.

J405 Features

- Much lower detection levels than the previous Jerome® models.
- 3 ½ inch (9 cm) backlit display, showing everything you need to be confident in the instrument, including 5/8 inch (1.6 cm) tall character readout, battery charge indicator, and sensor saturation percentage.
- Choice of units for results: micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) (default) or milligrams per cubic meter (mg/m^3).
- Easy to understand diagnostic and error detection.
- Auto zero bridge adjustment.
- Updated electronics including 24-bit a/d conversion and on-board storage for 20,000 samples.
- Controlled temperature film heat ensures the sensor removes all mercury and returns to its original state.
- The Jerome® J405 can be operated for 24 hours from the internal 12V battery source or it can be operated using the external AC power supply/charger.

Accessories and Maintenance Parts

The Accessories and optional items available to support the J405 are listed and pictured beginning on page 42.

Applications

- Regulatory detection compliance
- Regulatory clean up compliance
- Ambient air analysis
- Quality control
- Scrubber efficiency testing
- Accuracy check for other mercury vapor monitors and control systems
- Mercury vapor source detection
- Leak detection
- Portable mercury vapor detection. (The Jerome[®] J405 is operated from an internal 12V battery source. For charging the batteries, an external AC power supply/charger is included.)

3. JEROME® J405 TECHNICAL SPECIFICATIONS

	Units: $\mu\text{g}/\text{m}^3$	Units: mg/m^3
Display Range*	0.5 $\mu\text{g}/\text{m}^3$ to 999 $\mu\text{g}/\text{m}^3$	0.001 mg/m^3 to 0.999 mg/m^3
Resolution	0.01 $\mu\text{g}/\text{m}^3$ Hg	0.001 mg/m^3 Hg
Response time-sample mode	16 seconds	
Response time-survey mode	2 seconds	
Flow rate	750 \pm 50 cc/min (0.75 \pm 0.05 liters/min)	
Power requirements	12 VDC for the instrument (provided by the internal battery, AC power supply/charger, external battery pack or car accessory adapter) 100-240VAC, 47-63Hz, 3.2A for the AC power supply/charger	
Fuse	Auto-resetting fuse	
Internal battery pack	Rechargeable nickel metal hydride (NiMH)	
Operating environment	0 °C to 45 °C, non-condensing, non-explosive	
Case construction	Aluminum, powder coated	
Dimensions	11 in L x 6 in W x 6.5 in H (28 cm L x 16 cm W x 17 cm H)	
Weight	5.3 pounds (2.4 kilograms)	
Digital meter display	3 ½ inch (9 cm) liquid crystal display (LCD)	
Data storage capacity	20,000 samples	
Output	Digital: USB serial data to PC, printer or USB flash drive Analog: 4-20mA current loop (requires external power source) Accurate to 0.3% of output	
Certifications	TUV 61010, CE	

Accuracy and Precision:

Calibration Point	Accuracy**	Precision (RSD)
1.0 $\mu\text{g}/\text{m}^3$	\pm 10%	15%
25 $\mu\text{g}/\text{m}^3$	\pm 5%	3%
100+ $\mu\text{g}/\text{m}^3$	\pm 5%	3%

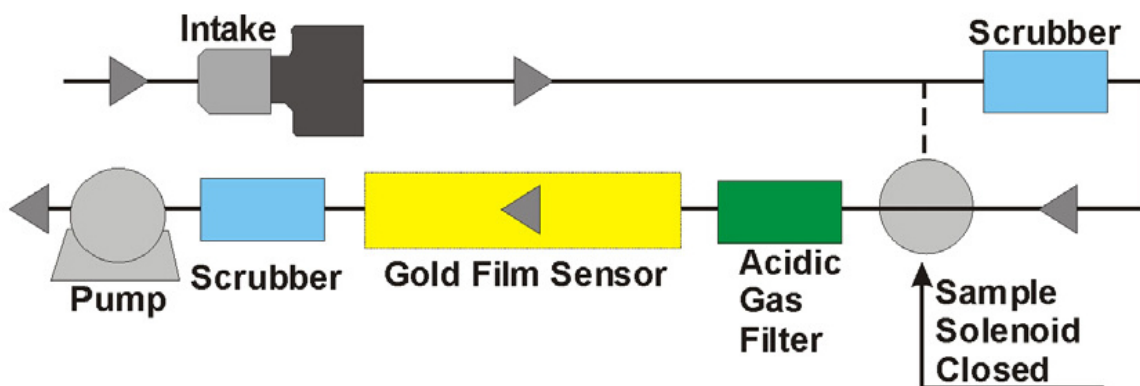
*Sample values below 0.5 $\mu\text{g}/\text{m}^3$ or 0.001 mg/m^3 will be recorded and displayed as 0.00 $\mu\text{g}/\text{m}^3$ or 0.000 mg/m^3 respectively by the J405. Sample values above 999 $\mu\text{g}/\text{m}^3$ (0.999 mg/m^3) will be recorded and displayed as “High Concentration.”

**After changing the AG filter, accuracy at 1.0 $\mu\text{g}/\text{m}^3$ may change from \pm 10% to \pm 20%, and accuracy at 25 $\mu\text{g}/\text{m}^3$ and 100 $\mu\text{g}/\text{m}^3$ may change from \pm 5% to \pm 7%. RSD is unchanged.

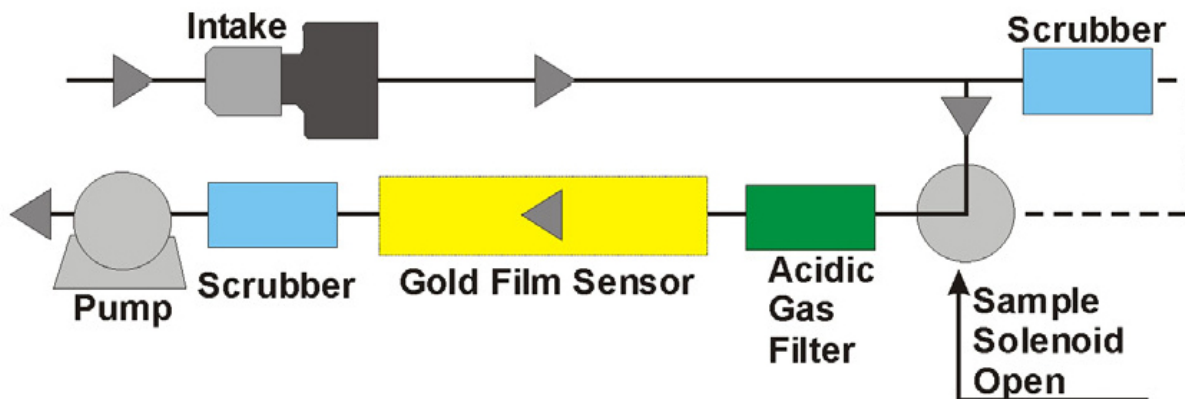
4. PRINCIPLE OF OPERATION

The heart of the J405 is the well-proven gold film sensing technology. A thin gold film, in the presence of mercury vapor, undergoes an increase in electrical resistance proportional to the mass of mercury vapor in the sample.

When the SAMPLE button is pressed, an internal pump pulls ambient air through a scrubber filter (AZI P/N: 600-0262) and into the flow system.



After three seconds, the sample solenoid bypass opens, closing off the scrubber filter from the flow system.



The sample air passes through the AG filter (AZI P/N: 600-0293), an acidic gas filter that removes any acidic gases that interfere with the sensor's response to mercury. Then the sample air is drawn over the gold film sensor. The sensor adsorbs the mercury vapor. Eleven seconds after starting, the sample solenoid bypass closes and the remainder of the sample is drawn through the scrubber filter and the flow system. The instrument determines the amount of mercury adsorbed and displays the measured mercury concentration on the digital meter in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or milligrams per cubic meter (mg/m^3) of mercury.

The instrument's microprocessor automatically re-zeroes the digital meter at the start of each sample cycle and holds the meter reading until the next sample cycle is activated, thus eliminating drift between samples.

During the sample mode cycle, a sensor saturation meter on the LCD represents the percentage of sensor saturation, or adsorbed mercury collected on the gold film. With use, the sensor becomes saturated and needs to be cleaned. This is accomplished by a manually activated 45-minute sensor regeneration cycle, which removes the mercury from the sensor. The solenoid bypass closes during the sensor regeneration cycle, causing the air to pass through the scrubber filter, providing clean air for the regeneration process. The closed loop film heat cycle ensures the sensor is cleaned to original values. The mercury released during regeneration is absorbed by the flow system's final scrubber filter (AZI P/N: Z2600 3930) to prevent any external contamination from the desorbed mercury. The 45-minute regeneration process includes a cool-down phase, so the instrument is ready for use as soon as the regeneration process finishes.

Zero Air Filter (AZI P/N Z2600 3905)

The Zero Air Filter (AZI P/N Z2600 3905) removes mercury vapor, mercaptans, and hydrogen sulfide from the air sample. Readings with the filter installed should be near $0.00 \mu\text{g}/\text{m}^3$. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

Because air that is cooler than the instrument will cause low readings and warmer air will cause higher readings, the Zero Air Filter should be used to equilibrate the instrument to ambient air. Repeated sampling with clean air will not cause saturation of the gold film sensor but will equalize temperatures faster to allow accurate analysis to begin sooner. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

The Zero Air Filter can also be used to identify contamination within the instrument. If the readings do not reduce to near $0.00 \mu\text{g}/\text{m}^3$ with the filter installed, contamination should be suspected. If the readings do drop to near $0.00 \mu\text{g}/\text{m}^3$ with the filter installed but elevate with the filter removed, the presence of mercury vapor at the sampled location is confirmed. Again, for maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

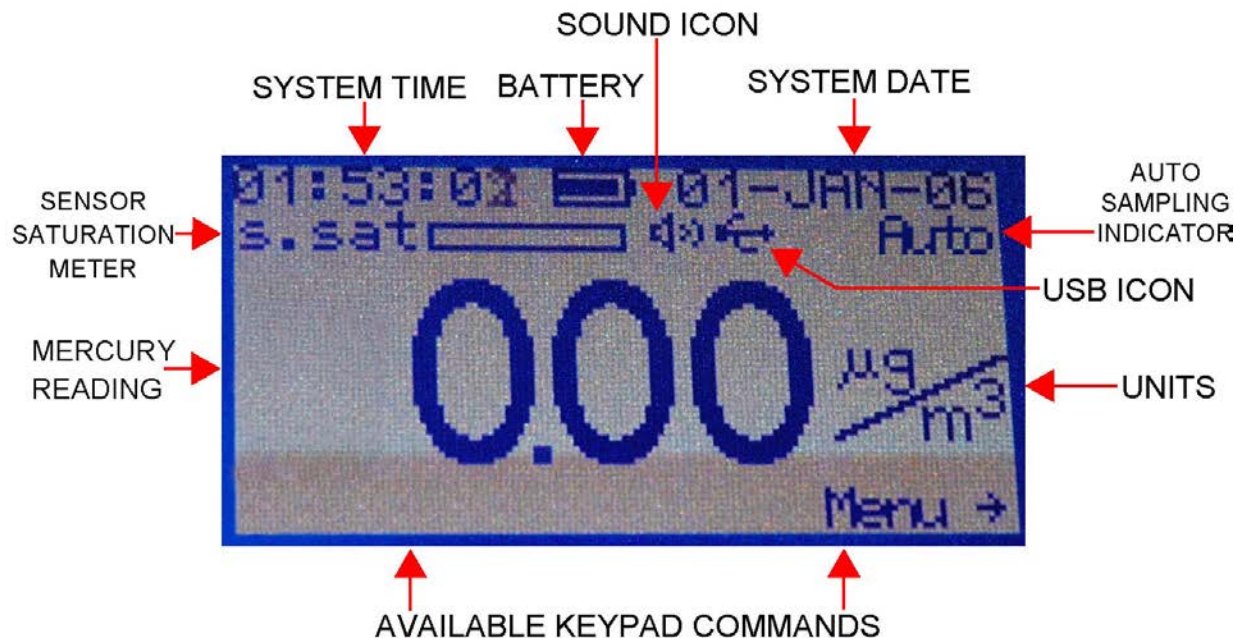
The Zero Air Filter should be inserted into the intake of the instrument when running the instrument Warm-up. See Warm-up in the section **REGEN menu** on page 17 for more information.

For more information on the use of the Zero Air Filter, contact customer service at 1-800-528-7411 or 602-470-1414.

5. INSTRUMENT OPERATION

J405 Main Screen Display

The J405 Main Screen is depicted below, followed by explanations of the labeled items.



SYSTEM TIME – As set in the SYSTEM menu. (See **SYSTEM menu** on page 20).

BATTERY – Indicates current charge level and charging status (See **Charging Internal Battery** on page 28)

SOUND ICON – Indicates if the audible alarm is turned on or muted, as set in the SYSTEM menu. (See **SYSTEM menu** on page 20).

SYSTEM DATE – As set in the SYSTEM menu. (See **SYSTEM menu** on page 20).

SENSOR SATURATION METER – Graphically indicates mercury saturation level of J405 sensor. (See **REGEN menu** on page 17).

USB ICON – Indicates proper functioning of USB ports, and flashes during USB transmission of data. (See **Retrieving Data** on page 29). If the USB icon is not present, this option is not activated. Contact your AZI Sales Representative for details on the USB option.

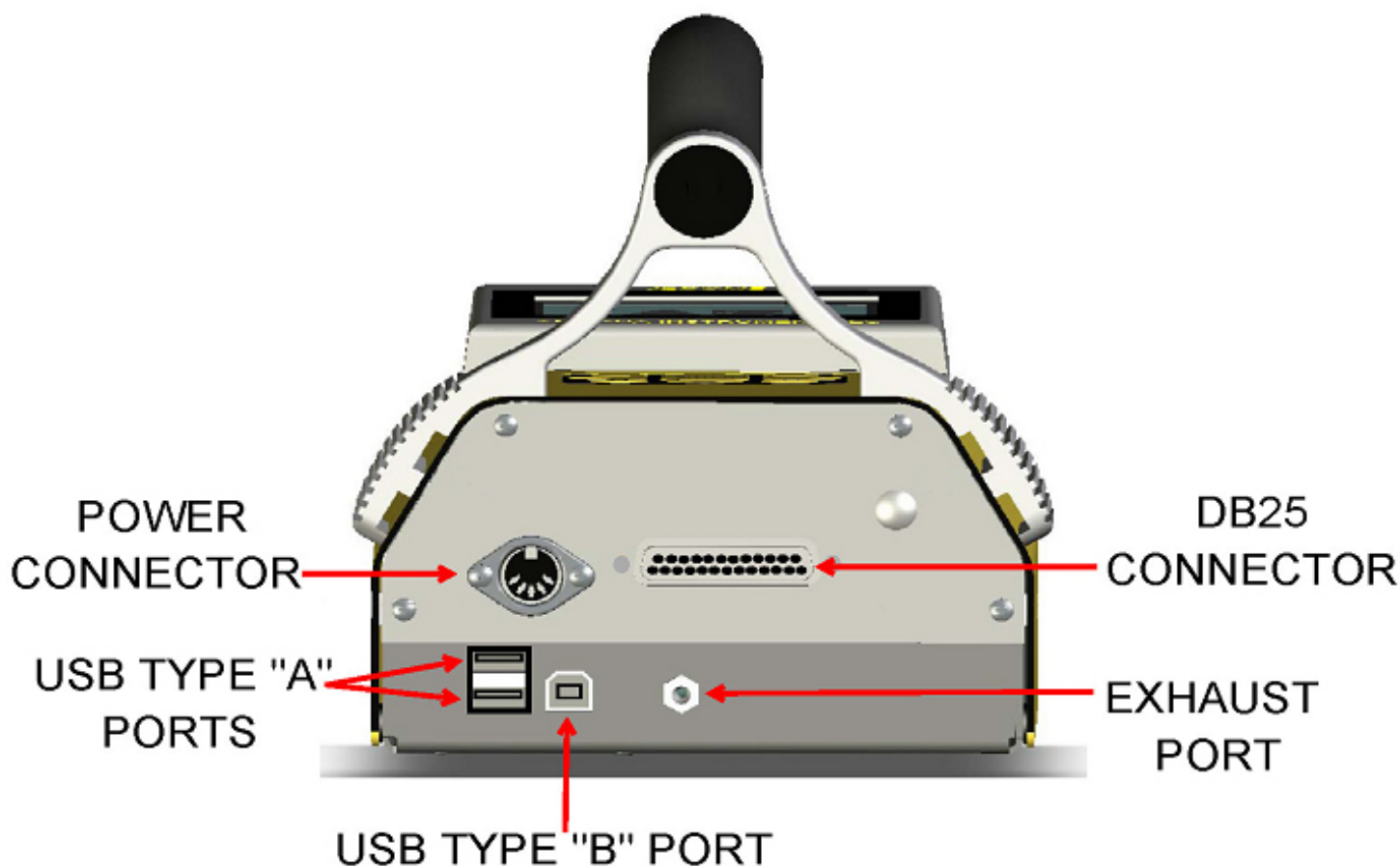
AUTO SAMPLING INDICATOR – Indicates if the J405 is set to sample automatically at regular intervals, as set in Sample Mode in the SAMPLE menu. (See **SAMPLE menu** on page 15).

MERCURY READING – The mercury concentration detected by the J405, in the units indicated.

UNITS – Units of mercury concentration reading, either micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or milligrams per cubic meter (mg/m^3), as set in the **SAMPLE menu**.

AVAILABLE KEYPAD COMMANDS – The bottom line of the screen indicates the currently available keypad commands. From the main screen, as shown here, the Main Menu can be accessed using the ► key.

J405 Back Panel Connections



The above-labeled connections are available from the back panel of the J405. If the USB option has not been activated, the USB ports will not be present. Contact your AZI Sales Representative for information on the USB option.

POWER CONNECTOR – Connect the supplied AC power supply/charger, the optional external battery pack (AZI P/N: 990-0214), or the optional car accessory jack (AZI P/N: 200-0170) here to provide power to the instrument or to recharge the battery.

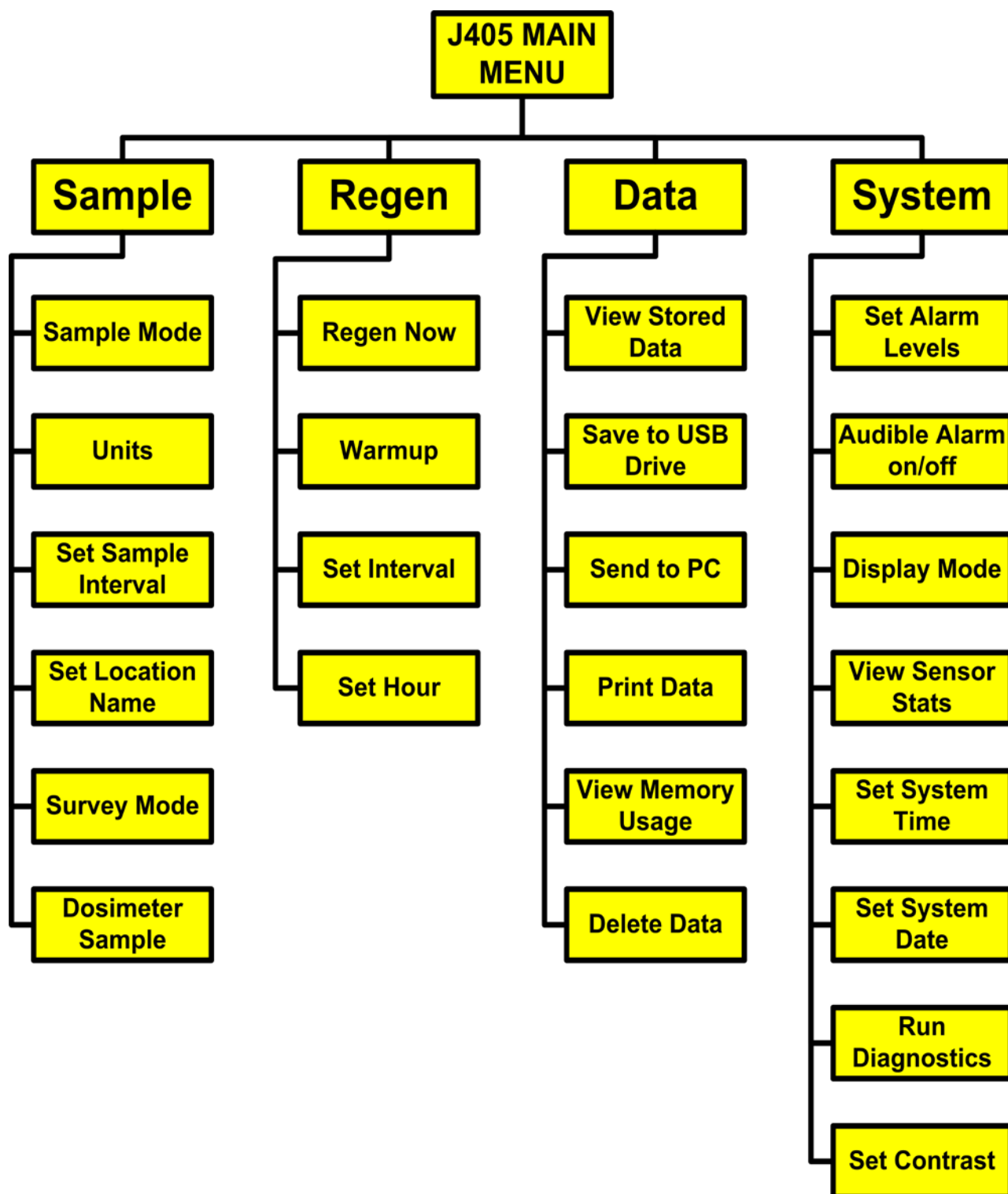
USB TYPE “A” PORTS – The USB Type “A” ports are used to connect a USB printer or USB memory drive for printing or saving sample data or to connect a USB keyboard for menu navigation or data entry. The two ports are identical, and either can be used. For more information, see **DATA menu** on page 18.

USB TYPE “B” PORT – The USB Type “B” port is used to connect the J405 directly to the USB port of a computer, using the included USB A to B cable (AZI P/N: 200-0165). For more information see **DATA menu** on page 18.

DB25 CONNECTOR – There are multiple specialized uses for the DB25 connector. See **Instrument I/O Interface** on page 30 for more information. **NOTE: This is not a printer port.**

EXHAUST PORT – After sampling, the sampled air is cleaned of any mercury and expelled from the exhaust port on the back of the J405.

J405 User Interface Main Menu Structure



NOTE: The main menu also contains a selection labeled “Factory.” This option is for AZI factory use only and is not accessible by the end user.

A USB keyboard (AZI P/N: 990-0230) can be used to navigate the menu system and for data entry for items such as Location Names. Connect the USB keyboard to one of the two USB Type “A” ports on the back of the instrument. Either upper or lower case characters may be entered when using a USB keyboard, while only upper case letters are available from the J405 keypad.

SAMPLE menu

SAMPLE MODE

The Sample Mode setting provides the choice between auto-sampling and manual sampling. For normal use, use manual sampling, which is the instrument default setting. If auto-sampling is selected, the instrument will automatically sample at the interval set in **SET SAMPLE INTERVAL** (below) without monitoring or attendance by the user. Use the ▲ and ▼ arrows to toggle between Manual and Auto, and use **ENTER/START** to save the selection. Use the **ESC** key to exit without saving changes. If auto-sampling is selected, the word Auto will appear below the system date on the instrument’s main screen.

UNITS

Sample results can be displayed in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or milligrams per cubic meter (mg/m^3). To change the displayed units, select **UNITS** from the **SAMPLE** menu. Use the ▲ and ▼ arrows to toggle the selection, and press **ENTER/START** to save the selection. Use the **ESC** key to exit without saving changes. The default selection is $\mu\text{g}/\text{m}^3$, and $\mu\text{g}/\text{m}^3$ is used throughout this manual for consistency. The relationship between $\mu\text{g}/\text{m}^3$ and mg/m^3 is as follows:

$$1000 \mu\text{g}/\text{m}^3 = 1 \text{mg}/\text{m}^3 \text{ and } 1 \mu\text{g}/\text{m}^3 = 0.001 \text{mg}/\text{m}^3$$

When the selected unit is changed with the **UNITS** menu item, all internally stored samples are converted and displayed with the new selected unit, regardless of what unit was in use when the sample was taken originally.

SET SAMPLE INTERVAL

If auto-sampling is being used (as set in **SAMPLE MODE** above), the sample interval determines how often the J405 will automatically take samples. Use the ▲ and ▼ arrow keys to scroll through the available sample intervals of 1, 2, 5, 10, 15, 30, 45, 60, 90 and 120 minutes, and use **ENTER/START** to save the selected interval. Use the **ESC** key to exit without saving changes.

The sample intervals refer to specific times on the instrument clock as measured in whole multiples of the selected interval. For example, selecting a 10-minute sample interval will result in samples being taken on the hour, 10 minutes after the hour, 20 minutes after the hour, etc., not every ten minutes from when auto-sampling is initiated. Refer to the chart on the next page for examples of how these intervals work. When the clock reads :00 seconds at the appropriate time, the sample will be taken.

Interval	Samples on the:	Examples:
1 minute	1-minute marks	12:00, 12:01, 12:02, 12:03, 12:04, 12:05, 12:06, etc.
2 minutes	2-minute marks	12:00, 12:02, 12:04, 12:06, 12:08, 12:10, 12:12, etc.
5 minutes	5-minute marks	12:00, 12:05, 12:10, 12:15, 12:20, 12:25, 12:30, etc.
10 minutes	10-minute marks	12:00, 12:10, 12:20, 12:30, 12:40, 12:50, 1:00, etc.
15 minutes	Quarter hour	12:00, 12:15, 12:30, 12:45, 1:00, 1:15, 1:30, etc.
30 minutes	Half hour	12:00, 12:30, 1:00, 1:30, 2:00, 2:30, 3:00, etc.
45 minutes	Times that are an even 45 minutes from midnight or noon	12:00, 12:45, 1:30, 2:15, 3:00, 3:45, 4:30, 5:15, 6:00, 6:45, 7:30, 8:15, 9:00, 9:45, 10:30, 11:15, etc.
60 minutes	Hour	12:00, 1:00, 2:00, 3:00, 4:00, 5:00, 6:00, etc.
90 minutes	Times that are an even 90 minutes from midnight or noon	12:00, 1:30, 3:00, 4:30, 6:00, 7:30, 9:00, 10:30, etc.
120 minutes	Times that are an even 120 minutes from midnight or noon	12:00, 2:00, 4:00, 6:00, 8:00, 10:00, etc.

SET LOCATION NAME

Up to 80 unique location presets are available using the J405. This feature is useful if sampling is done in multiple locations and there is a need to record which readings came from which locations. Use the ▲ and ▼ arrows to scroll through the list of 80 presets until the location to be edited is highlighted. Press **ENTER/START** to begin editing the name of the selected location. Use the ▲ and ▼ arrows to scroll through the available alphanumeric characters and punctuation. When the desired character is displayed, use the ► arrow to move to the next character field. If a mistake is made, the ◀ arrow can be used to return to the previous character. When the location has been named as desired, press **ENTER/START** to save the location name, and return to the list of locations. To select an existing location from the list for the samples to be taken, use the ▲ and ▼ arrows to scroll to the desired location, and press **ENTER/START** twice. Note the asterisk (*) located to the left of the currently selected location. The selected location name will be stored with the sample data for all samples taken until a different location is selected instead. After deleting data, it is necessary to re-select the Location Name before taking any samples, otherwise the location will not be recorded. Use **ESC** to return to the sample menu. See **Retrieving Data** on page 29 for more info.

DOSIMETER SAMPLE

Not currently available.

SURVEY MODE

Highlight **SURVEY MODE** in the **SAMPLE** menu and press **ENTER/START** to begin immediate sampling in survey mode. In survey mode, after an initial two-second pause to purge the flow system, the J405 will sample continuously. For complete information on survey mode, see **Survey Mode** on page 25.

REGEN menu

The sensor saturation meter on the main screen (to the right of **s. sat**) indicates the current level of saturation of the sensor with mercury.

Clean/Regenerated Sensor



Partially Saturated Sensor



Saturated Sensor –
Regen Required



When the sensor becomes saturated with mercury, as indicated by the sensor saturation meter, a regeneration (regen) must be performed on the sensor to release the accumulated mercury, before additional samples can be taken. See **Sensor Regeneration** on page 23 for more information on the regen procedure.

The AC power supply/charger or the external battery pack must be plugged into the back of the instrument before a regen can be performed.

The following options are available from the REGEN menu:

REGEN NOW

Connect external power to the instrument before performing a regen.

Highlighting **REGEN NOW** and pressing **ENTER/START** will start the sensor regeneration process. Press **ENTER/START** again on the next screen to confirm your choice, and press **ENTER/START** again after reading the warning that appears. The regeneration will now begin. **Do not disconnect external power during the regeneration.**

WARMUP

To ensure maximum accuracy when sampling at cleanup levels less than $3 \mu\text{g}/\text{m}^3$, the J405 must be warmed up with the Zero Air Filter in the intake, at the location to be sampled. To run the warm-up, insert the Zero Air Filter in the intake, highlight **WARMUP** and press **ENTER/START**. While warming up, the pump will run and the J405 will display a 5-minute countdown. When the warm-up finishes, remove the Zero Air Filter and begin normal sampling. If the J405 is idle for more than 20 minutes, another warm-up is required to maintain maximum accuracy at these low levels.

SET INTERVAL

If auto-sampling is being used (as set in **SAMPLE MODE** above), the J405 can be configured to automatically perform sensor regenerations at a predetermined interval. Use the ▲ and ▼ arrows to scroll through the available intervals of 6, 12, 24 and 48 hours and Saturation, and press **ENTER/START** to save the selected interval. The J405 will now automatically perform a sample followed by a regen every 6, 12, 24, or 48 hours starting at the time set in **SET HOUR** below or when the sensor is saturated, as selected. Use **ESC** to exit without saving.

SET HOUR

Use the ▲ and ▼ arrow keys to select the hour of the day (using a 24-hr clock) to start regeneration. Press **ENTER/START** to save the setting. At the time set, if auto-sampling is being used, the J405 will automatically take one sample and then perform a sensor regeneration. This process will repeat at the interval indicated in **SET INTERVAL** above. Use **ESC** to exit without saving.

NOTE: If the sensor is saturated and a regeneration cycle is performed and completed before the set hour, the instrument will perform another regeneration at the set hour. However, if the regeneration cycle does not complete prior to the set hour, the regeneration at the set hour will be skipped.

DATA menu

Sample data can be stored within the instrument, up to a maximum of twenty thousand (20,000) data points. On instruments that have the USB Communications option, data can be retrieved from the instrument in one of three ways:

1. SEND TO PC
2. SAVE TO USB MEMORY DRIVE
3. PRINT DIRECTLY TO AN AZI APPROVED PRINTER (AZI P/N: Y990-0098)

The presence of the USB icon on the main screen indicates that the Communications option has been purchased and that the USB ports are functioning properly. The USB icon will flash during data transmission. See **J405 Main Screen Display** on page 12 for the location of the USB icon. The data is stored in non-volatile memory and will not be affected if the battery is changed or disconnected.

VIEW STORED DATA

Select **VIEW STORED DATA** to view previous sample and regeneration history on the screen of the J405. The Location Name (if specified) corresponding to the data is displayed at the top of the screen and three sample values at a time are displayed at the bottom of the screen, along with the date and time the sample was taken. The most recent sample is displayed at the top of the list, and regenerations are indicated by the word “Regen” instead of a sample value. Use the ▲ and ▼ arrow keys to scroll through the data. If Location Names are used, the Location Name displayed will automatically update during scrolling to reflect the sampling location of the data being displayed. The J405 will beep-beep upon reaching the end of the list. After viewing the data, press **ESC** to exit and return to the **DATA** menu.

On instruments that have the USB Communications option, all of the data is accessible from the **VIEW STORED DATA** menu selection. On instruments that do not have the USB Communications option, only the previous two samples are stored.

SAVE TO USB DRIVE

Before selecting **SAVE TO USB DRIVE**, connect the target USB memory drive to either USB TYPE “A” PORT on the back panel of the J405. When **ENTER/START** is pressed, all of the stored data on the J405 will be transmitted to the target drive as a comma-delimited text file. See **Retrieving Data** on page 29 for more information.



NOTE: The J405 is **NOT** compatible with USB memory drives that have the U3 program pre-installed. Do not use USB memory drives that have the U3 program with the J405.

SEND TO PC

Before using **SEND TO PC**, the USB driver must be installed on the target PC, and HyperTerminal must be configured on the target PC. The USB driver is on the CD with this operations manual and on the AZI website at www.azic.com. See **APPENDIX A – USB/HYPERTERMINAL SETUP** on page 47 for detailed instructions on installing the USB driver, configuring HyperTerminal, and downloading data from the J405. Once the target PC has been configured, connect the included USB A to B cable (AZI P/N: 200-0165) between the USB TYPE “B” PORT on the back panel of the J405 and the USB PORT of the target computer, and launch HyperTerminal. On the J405, with **SEND TO PC** highlighted, press **ENTER/START**, and all of the stored data on the J405 will be transmitted to the target computer as a comma-delimited text file. See **Retrieving Data** on page 29 for more information.

PRINT DATA

Before selecting **PRINT DATA**, connect an AZI printer (AZI P/N: Y990-0098) to either USB TYPE “A” PORT on the back panel of the J405 using the cable supplied with the printer. When **ENTER/START** is pressed, all of the stored data on the J405 will be printed on the attached printer. See **Retrieving Data** on page 29 for more information.

VIEW MEMORY USAGE

The J405 can store up to 20,000 data points. Selecting **VIEW MEMORY USAGE** will display what percentage of the data storage area is in use. Once the data memory is full, no additional data can be stored until the data on the instrument is deleted. If the memory is full, the J405 will continue to perform as expected, but it will indicate that the memory is full and no new sample data will be retained. The storage area can be cleared using **DELETE DATA** as described below.

DELETE DATA

Selecting **DELETE DATA** will delete all sample data stored on the J405. Prior to deletion, the J405 will prompt the user for confirmation as a precaution.

SYSTEM menu

The SYSTEM menu is password protected to prevent unwanted or accidental changes to operating parameters. The default initial password is AZI, but should be changed to something unique if restricted access to the SYSTEM menu is desired. The password can be up to 10 characters long.

When the SYSTEM menu is selected from the Main Menu, the J405 will prompt for the password. Input the password using ▲ and ▼ to change the alphanumeric character, and ► and ◀ to move between characters. Press **ENTER/START** to proceed after entering the password.

When the correct password is entered, the J405 will offer the option to change the password by pressing the **A** key or to proceed to the SYSTEM menu by pressing **ENTER/START**. The SYSTEM menu will then remain unlocked until the instrument is powered off and back on.

SET ALARM LEVELS

When sampling, if the mercury level exceeds the selected alarm level, the word “ALARM” will flash on the J405 display. If AUDIBLE ALARM is set ON, the J405 will also beep three times. Two different alarm levels can be set using this menu option. Use the ▲ and ▼ arrow keys to change the value of the blinking field, and the ► arrow to move to the next character in the alarm level setting. Typically, the high alarm is used for an industrial alarm level, while the low alarm is set to a residential value. Use the **A** and **B** buttons to switch between the high and low alarm settings by pressing **A** to select the high alarm or **B** to select the low alarm. Once the alarm level has been set, press **ENTER/START** to select the highlighted alarm level as the current alarm level to be used. Upon returning to the **SET ALARM LEVELS** screen, there will be asterisk next to the currently selected alarm level (either high or low). It is recommended to set the alarm level higher than $0.5 \mu\text{g}/\text{m}^3$. The alarm can be muted using **AUDIBLE ALARM ON/OFF** in the **SYSTEM** menu.

AUDIBLE ALARM ON/OFF

Use the ▲ and ▼ arrow keys to toggle the audible alarm on or off, and use **ENTER/START** to save the desired setting. Press **ESC** to exit without saving changes. The main screen display has a sound icon that indicates if the alarm is currently turned on or muted. The action lines in front of the sound icon will disappear when the audible alarm is muted. See **J405 Main Screen Display** on page 12 to locate the sound icon.

DISPLAY MODE

From the **DISPLAY MODE** screen, use the ▲ and ▼ arrow keys to toggle between Threshold and Scientific display modes, and press **ENTER/START** to save the setting. In Scientific display mode, the J405 displays the sample reading for every sample taken. In Threshold display mode, the sample reading must be within 85% of the set alarm level to be displayed. Results below 85% of the alarm level value will be displayed as $0.00 \mu\text{g}/\text{m}^3$ instead. Use **ESC** to exit without saving. See **SET ALARM LEVELS** above to set Threshold limits.

NOTE: Threshold display mode cannot be used with auto-sampling. If this combination is accidentally used, testing may halt. If this occurs, cycle power to the instrument and then turn off either Threshold display mode or auto-sampling.

VIEW SENSOR STATS

Use **VIEW SENSOR STATS** to display the current saturation level of the sensor, the number of regenerations performed on the sensor, and the total number of samples read by the sensor. Press any key to exit the screen when finished.

SET SYSTEM TIME

The J405 maintains the system time using a 24-hr clock format. Use the ▲ and ▼ arrow keys to change the value in the field where the cursor is flashing. Use the ◀ and ▶ arrow keys to move between the two digits within the hour or minute fields, and use the A and B keys to switch between the hour and minute fields. Use **ENTER/START** to save the indicated time as the system time or **ESC** to exit without saving.

SET SYSTEM DATE

Use the ▲ and ▼ arrow keys to change the highlighted field, and the ◀ and ▶ arrow keys to move between characters within the day or year fields. Use the A and B keys to move between the day, month, and year fields. Press **ENTER/START** to save the system date or **ESC** to exit without saving.

RUN DIAGNOSTICS

Selecting **RUN DIAGNOSTICS** will start the J405's self-diagnostic procedure. As the instrument proceeds through each diagnostic check, **follow the on-screen prompts**, and the instrument will display the specific check being performed and the pass/fail result of the check. If the check is not applicable to the current configuration of the instrument, the result field will be blank instead of indicating pass or fail.

- After viewing each result, press any key (except I/O or ESC) to move to the next diagnostic check. (I/O should not be used during the diagnostics because I/O will power off the instrument and ESC should only be used when specifically indicated by the instrument.)
- When testing the keypad, follow the on-screen prompts to press each of the keys in turn. The J405 will not indicate a pass/fail for this test. Instead, if all of the keys work and the instrument proceeds to the next diagnostic test, the keypad diagnostic has passed.
- When testing 80V power, press **ENTER/START** to pass the test and proceed to the next test. Pressing **ESC** will stop the test and return a Fail.
- If the 4-20mA output function of the J405 is not in use, press **ENTER/START** to cycle through the 4, 8, 12, 16 and 20mA checks in the diagnostic routine. If the 4-20mA output is in use, the diagnostics can be used to verify proper operation. Refer to **4-20mA Output** on page 30 for more information.

After the last diagnostic result has been displayed, the instrument will display "Done," and pressing any key will return to the main screen of the J405.

SET CONTRAST

The display contrast can be set from 0 (highest contrast) to 127 (least contrast) by using ▲ and ▼ to adjust the contrast. By default, ▲ and ▼ will adjust the contrast in increments of 1 unit. Press B to switch to a coarse adjustment of 10 units for each press of ▲ or ▼. Press A to switch back to the default fine adjustment mode. Press **ENTER/START** to save the contrast setting and exit.

Daily Operations

Before each day's use of the Jerome[®] J405, perform the following steps to verify proper instrument operation:

- Press the power **I/O** button.
 - The display will light up and show instrument serial number and software revision.
 - If necessary, press **ESC** to clear any calibration reminders. Call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com, to schedule instrument calibration.
 - The digital meter displays 0.00 µg/m³.
 - Check the battery level as indicated by the battery icon at the top center of the instrument display.
 - If the battery meter is empty and flashing, refer to **Charging Internal Battery** on page 28.
 - If the battery meter is not empty, but is flashing, then the instrument is currently charging the battery.
 - When the instrument is plugged in and powered off, the display will stay active and indicate “Charging.”
 - To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- Perform sensor regeneration. Refer to **Sensor Regeneration** on page 23 for the procedure.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- Use the Zero Air Filter to equilibrate the instrument to ambient air temperature.
 - Install the Zero Air Filter in the instrument's intake.
 - Sample repeatedly every 15 seconds until the readings stabilize, then remove the Zero Air Filter.

NOTE: For EPA clean-up levels less than 3 µg/m³, it is necessary to run a warm-up routine before sampling. To initiate the automatic five minute warm-up, install a **Zero Air Filter (AZI P/N Z2600 3905)** in the intake, and select **Warmup** from the **REGEN** menu. For levels of 3 µg/m³ and above, the warm-up routine is not necessary.

- Press the **SAMPLE** button (at the end of the handle).
- At the end of the sampling cycle, read the digital meter.
 - The number shown on the digital meter is the mercury vapor concentration in µg/m³.
 - This sampled mercury value remains on the display until the next sample is taken.
 - The digital meter automatically re-zeroes at the start of each sample.
- At the end of each day's use, perform sensor regeneration as described in the next section.



**DO NOT ALLOW MERCURY VAPOR TO STAY ON
THE GOLD FILM SENSOR OVERNIGHT.**



Sensor Regeneration

Sensor regeneration is needed to clean the J405 sensor of any accumulated mercury vapor and to prolong the life of the sensor. This simple procedure should be done:

- At the beginning of the day on which the instrument is to be used.
- During the day when the sensor becomes saturated.
- At the end of the day before storing the instrument.
- At a minimum of 30-day intervals while the instrument is in storage.

To perform sensor regeneration:

- Plug the AC power supply/charger or the external battery pack into the back of the instrument.
- Press the power **I/O** button to power on the instrument.
- If necessary, press **ESC** to clear any calibration reminders. Call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com, to schedule instrument calibration.
- From the Main Screen, press the RIGHT arrow button (▶) to enter the main menu.
- Press the DOWN arrow button (▼) to move the cursor to **Regen**.
- Press the RIGHT arrow button (▶) to select **Regen** from the menu.
- Press the **ENTER/START** button on the keypad to select **Regen Now** from the Regen menu.
 - The instrument will respond with “Perform Regen Using EXTERNAL POWER?”
 - Press **ENTER/START** to proceed or **ESC** to exit.
 - The instrument display will warn “Do Not Disconnect External Power while Heating”.
 - Press **ENTER/START** to proceed or **ESC** to exit.
 - The instrument will begin a 45-minute regeneration cycle, indicated by “Regeneration in Progress” on the display. **Do not interrupt this cycle.**
 - If any error message appears on the display, see the **J405 TROUBLESHOOTING** section beginning on page 38.
- The LCD screen displays Regeneration in Progress for the duration of the 45-minute cycle and displays a countdown timer as well once the instrument enters the cooling process of the regeneration. When the cycle is completed, the instrument returns to the main screen.

DO NOT INTERRUPT THIS CYCLE.

Wait until the cycle is completed before continuing with the next step.

- The instrument can be used immediately following the sensor regeneration if necessary.
- The Jerome[®] J405 is ready for sampling.

CAUTION:

The Jerome[®] J405 is intended for gaseous vapor use only. DO NOT allow the probe or the instrument's intake to be exposed to liquids, dust or other foreign material. Moisture or liquids drawn into the instrument can damage the sensor and flow system.



Sample Mode

This mode, used for standard operation, produces optimum accuracy with the Jerome® J405. See **JEROME® J405 TECHNICAL SPECIFICATIONS** on page 9 for the accuracy specifications.

- Press the power **I/O** button. The display will light up and briefly show the instrument serial number and software revision. If necessary, press **ESC** to clear any calibration reminders.
 - Next, the digital meter displays $0.00 \mu\text{g}/\text{m}^3$. If the battery meter is empty and flashing, recharge the battery. See the section **Charging Internal Battery** on page 28.
- To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- Press the **SAMPLE** button (located at the end of the handle).
- At the end of the 16-second cycle, read the digital meter.
 - The number shown on the digital meter is the mercury concentration in $\mu\text{g}/\text{m}^3$. This value remains displayed until the next sample is taken. The digital meter automatically re-zeroes at the start of each sample.
- When the sensor is completely saturated, the digital meter displays Sensor Regeneration Required when sampling is attempted. No further operation is possible until a sensor regeneration is performed. (Refer to the **Sensor Regeneration** procedure on page 23.)
- Press the **I/O** button to turn the power OFF when not in use.



Sampling Notes

- The Jerome® J405 is intended for vapor use only. **DO NOT** allow the probe or the instrument's intake to come in contact with liquids, dust or other foreign material. Moisture or liquids drawn into the instrument can damage the sensor and flow system.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.
- The Jerome® J405 operates a minimum of 24 hours on a fully charged battery.
- Use the probe (AZI P/N: 1400-2002) to locate mercury vapor in hard to reach places. Plug the probe directly into the instrument's intake.
- Accessing the menus during sampling can corrupt current sample data, and should be avoided.

Survey Mode

The survey mode takes samples and displays the result every 2 seconds automatically. Use this mode to locate mercury spills or to assess areas of potentially high mercury concentrations. Sampling in the survey mode is not as accurate.

- Press the power **I/O** button.
- The display will light up and show the instrument serial number and software revision.
 - If necessary, press **ESC** to clear any calibration reminders.
 - Next, the digital meter displays 0.00 $\mu\text{g}/\text{m}^3$. If the battery meter is empty and flashing, recharge the battery. See **Charging Internal Battery** on page 28.
 - To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- From the Main Screen, press **►** to enter the Main Menu.
- From the Main Menu, select the Sample menu.
- Scroll through the Sample menu to Survey Mode.
- Press **ENTER/START** to select Survey Mode and begin sampling.
 - The instrument performs a 2-second purge of the flow system, and then begins survey mode sampling.
 - The display updates the measured concentrations at the end of each 2-second sample cycle.

NOTE: Approximately 65 samples at 100 $\mu\text{g}/\text{m}^3$ may be taken before a sensor regeneration is required.

- The pump will continue to run and the display will update with a new mercury concentration reading every 2 seconds.
- Press any button to stop survey mode sampling and perform a final purge of the flow system.
- The instrument remains in the survey mode until one of the following occurs:
 - A button is pressed on the keypad.
 - The sensor is saturated
 - A low battery signal is encountered
 - The instrument is turned OFF.
- The final survey value remains displayed on the main screen until the next sample is taken.

Press the power **I/O** button to turn the instrument off when not in use.

Operating on AC Power or Generator

- For stationary use, the J405 may be operated on AC power.
 - Operating the instrument on AC power at all times eliminates the need for the battery pack and its necessary maintenance.
 - The battery may be disconnected internally or removed completely whenever the instrument is operating on AC power.

Operating on Internal Battery Power

For portable use, the J405 may be operated on battery power.

- When you operate the instrument on battery power, please be aware of the following:
 - A fully charged battery pack (AZI P/N 200-0143) provides power for a minimum of twenty-four (24) hours of operation.
 - For operating more than twenty-four (24) hours, an extra fully charged battery pack is needed.
 - Complete battery recharging takes 3 hours. Refer to **Charging Internal Battery** on page **28**.
 - The J405 uses a rechargeable Nickel Metal Hydride battery. Dispose of worn-out batteries properly when you are replacing the battery pack.

When operating on battery power, the J405 will shut down after twenty (20) minutes of non-usage. However, if the instrument is running in Survey Mode or Auto-Sampling mode, the instrument will not shut off after twenty minutes. If the J405 is reading low levels of mercury in Survey or Auto-Sampling mode, it will continue to sample until the battery runs out. However, if the J405 is reading high levels of mercury in Survey mode, when the sensor reaches saturation a message will appear indicating that sensor regeneration is required, and twenty minutes later the instrument will automatically power off. In Auto-Sampling mode, the instrument will regen automatically when the sensor is saturated, provided external power is connected. If external power is not connected, the instrument will indicate “External Power Required to Regen” and the regeneration will not be performed until power is restored.

Battery Management

With all handheld and battery powered instruments, there is a need to keep the battery properly charged and ready for use. Proper battery management will not only ensure the instrument is ready when needed, but will also extend the life of the battery.

There are 3 different battery management methods recommended based on the frequency of instrument use. An additional option to ensure the instrument is ready to go at a moment's notice is to purchase an AZI external battery pack (AZI P/N: 990-0214). See **External Battery Power** on page **27** for more information on the External Battery Pack.

High Frequency user: Daily and weekly usage.

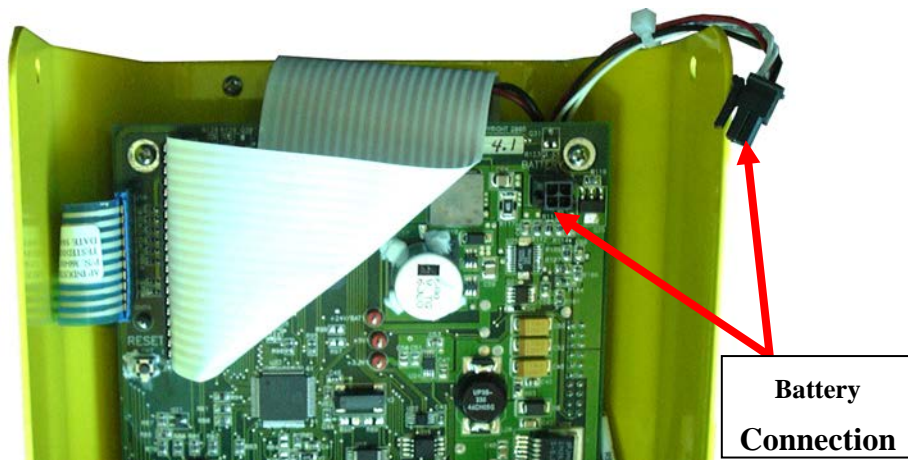
For this type of user, the instrument should be plugged in anytime the instrument is not being used.

Medium Frequency user: Once per month usage.

For this type of user, the instrument should be plugged in for a minimum of three (3) hours prior to use. Otherwise, the instrument can be left unplugged.

Infrequent user: Greater than one month between uses or long term storage.

For this type of user, the instrument should be fully charged and the battery should be disconnected. Make sure nothing is plugged into the back of the J405, then remove the front 2 screws near the intake and open the instrument. On the front most part of the main circuit board, there is a black 4 pin connector, as shown here. Depress the safety latch on the connector and pull it out to disconnect the battery. Close the instrument and replace the 2 screws in the front of the instrument. Reverse these steps to reconnect the battery if the instrument is going to be used. The time and date will need to be reset when the battery is reconnected for instrument use. See **SYSTEM menu** on page 20 for instructions.



If the instrument will be in storage for more than 4 months, it will need to be taken out of storage and fully charged every 4 months before being placed back in storage. To do so, reconnect the battery and connect the AC power supply/charger to charge the instrument for a minimum of 3 hours. See **Charging Internal Battery** on page 28 for charging instructions. After charging, disconnect the battery before returning the instrument to storage. Again, the time and date will need to be reset if the battery is reconnected so the instrument can be put into service.

Sample data is stored in non-volatile memory and will not be lost or affected when the battery is disconnected or replaced.

External Battery Power

An optional external battery pack (AZI P/N: 990-0214) is available to power the J405, but it is not recommended for routine use. The external battery pack should be reserved for sensor regenerations or sampling when the internal battery is nearly discharged and AC current for recharging the internal battery pack is unavailable. The external battery pack will not recharge the J405's internal battery pack.

The external battery pack is recharged by connecting the J405's AC power supply/charger between an AC outlet and the female DIN connector on the external battery pack. The green LED on the external battery pack will light up during charging of the external battery pack, and then go out once the external battery pack is fully charged; this takes approximately 4 hours. The red LED on the external battery pack will only light up if there is a battery fault or error. Should this occur, call AZI Customer Service at 800-528-7411, 602-470-1414, or e-mail support@azic.com for additional information. If the AC power supply/charger is connected to the external battery pack while the external battery pack is connected to the J405, both the J405 and the external battery pack will be recharged.

When operating using the external battery pack, the J405 will shut down after twenty (20) minutes of non-usage. However, if the instrument is running in Survey Mode or Auto-Sampling mode, the instrument will not shut off after twenty minutes. If the J405 is reading low levels of mercury in Survey or Auto-Sampling mode, it will continue to sample until the battery runs out. However, if the J405 is reading high levels of mercury in Survey mode, when the sensor reaches saturation a message will appear indicating that sensor regeneration is required, and twenty minutes later the instrument will automatically power off. In Auto-Sampling mode, the instrument will regen automatically when the sensor is saturated.

Additionally, using the optional Car Accessory Cable (AZI P/N: 200-0170), the J405 may be powered from a car accessory jack (cigarette lighter) and draw power directly from the battery of a vehicle. The Car Accessory Cable can be used for sensor regeneration or sampling when the internal battery pack is nearly discharged and AC current for recharging the internal battery pack is unavailable. The Car Accessory Cable will not recharge the J405's internal battery pack.

In order to use the external battery pack or the Car Accessory Cable, the J405's internal battery pack must be installed in the instrument. If the internal battery pack is disconnected or removed, neither of these accessories will be able to provide power to the instrument.

To order either of these accessories or for additional information, call AZI Customer Service at 800-528-7411, 602-470-1414, or e-mail support@azic.com.

Charging Internal Battery

- The internal battery needs to be charged if the battery indicator icon on the main screen is empty and flashing.
- Connect the AC power supply/charger between the J405 power receptacle and an AC power source.
- The battery icon will flash during charging and show as half full until fully charged.
 - Complete battery recharging takes 3 hours.
 - The J405 contains a trickle charger so it may be continually plugged into an AC power source without damaging the battery pack.
 - When the instrument is plugged in and powered off, the display will stay active and indicate "Charging."



**Flashing Icon: Battery
Needs to be Charged**



**Partially Full Battery
(If Flashing, Battery is Charging)**



**Fully Charged Battery
(If Flashing, Battery is Charging)**

When the battery fails to hold a charge, the battery pack should be replaced.

- Battery life under normal usage is approximately 1 year, depending on the number of charge and discharge cycles. See **Replacing the Battery Pack** on page 36.

Retrieving Data

On instruments that have the USB Communications option, sample data can be transmitted from the J405 for analysis using the USB connections on the back panel of the J405. Data may be transmitted directly to a PC, saved to a USB drive plugged into the J405 or printed to an AZI printer connected to the J405. See the **DATA menu** section on page 18 for the specific data transmission options available. If the USB Communications option has not been purchased, the USB ports will not be present. Contact your AZI Sales Representative for information on the USB option.

The data is transmitted in a comma-delimited text file named “serialnumber.txt” (for example 40500411.txt) with a four-line header indicating the model and serial number of the instrument, the date and time of the report, and the gas being detected. The first line of the data indicates the contents of each data field, as shown below. The USB icon on the main screen will flash during data transmission. If an instrument data file with the same filename already exists on the USB drive, the current data will be appended to the existing file.

The data file will look like this example:

```
Jerome Model: J405-0007
Serial Number: 405-00411
Date: 01-OCT-2010 14:27:54
Gas: Hg
```

```
dd-MMM-yyyy,hh:mm:ss,Reading,Units,Temp-C,Type,Location
01-OCT-2010,13:36:03, 25.04, ug/m3, 25.43,M,LAB
01-OCT-2010,13:36:32, 24.72, ug/m3, 25.43,M,LAB
01-OCT-2010,13:38:12, 24.31, ug/m3, 25.50,A,LAB
01-OCT-2010,13:39:12, 24.31, ug/m3, 25.68,A,LAB
01-OCT-2010,13:40:38, 25.11, ug/m3, 25.80,S,LAB
01-OCT-2010,13:40:40, 25.21, ug/m3, 25.80,S,LAB
01-OCT-2010,13:41:24, 0.00, ug/m3, 25.68,R,LAB
```

- The Temp field lists the internal temperature of the instrument in degrees Celsius at the time of sampling.
- The Type field lists a single letter code that indicates the type of sample taken, as follows:
 - M:** Manual Sample
 - A:** Auto Sample
 - S:** Survey Mode Sample
 - d:** Intermediate Dosimeter Result (not currently available)
 - D:** Final Dosimeter Result (not currently available)
 - R:** Regeneration (indicates date and time of regeneration).
(For regenerations, the sample value listed will always be 0.00 µg/m³.)
- The Location field lists the location where the sample was taken, as set using **SET LOCATION NAME** in the **SAMPLE menu**. See the **SAMPLE menu** section on page 15 for more details. If Location Names are used and the data is output to a printer from the J405, consecutive samples at the same location will be grouped together.
- If the data is transmitted directly to a PC, there will be one additional line at the end of the file indicating the number of records. This line will be in the form **[DATA:####]** with the #### indicating the number of records, as shown on page 56.

Instrument I/O Interface

The J405 I/O port is a DB-25F connector on the back of the instrument that provides numerous specialized functions for specific industrial applications and for factory use. System integration utilizing the 4-20mA output feature is the most common use of the I/O port.

NOTE: This is NOT a printer connection.

It is a specialized interface. Connecting any non-AZI authorized device to this connector may damage both the device and the J405 and may void the warranty on the J405.

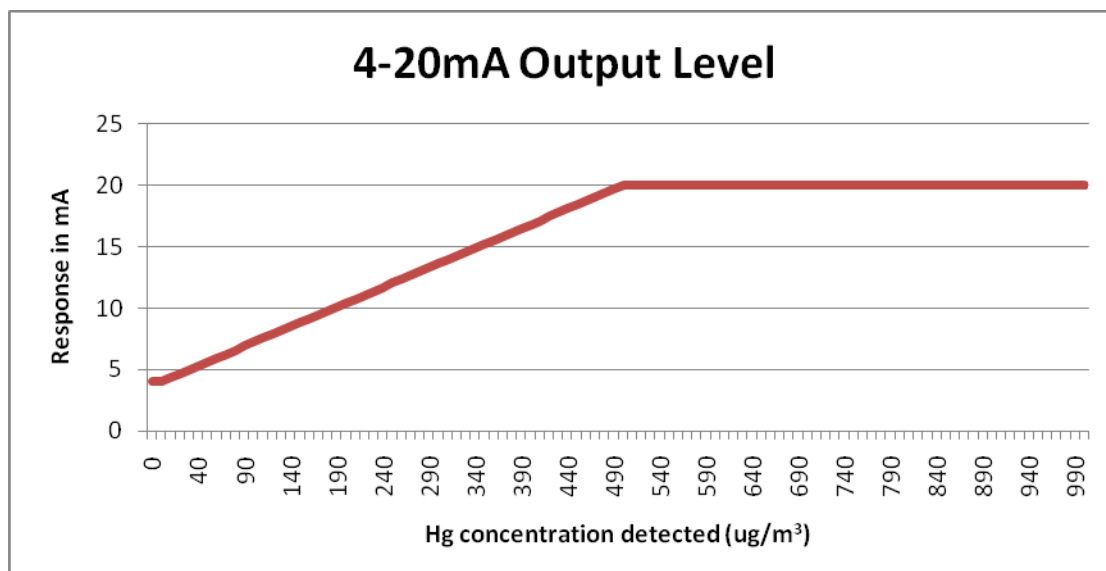
4-20mA Output

The 4-20 mA output can be used to indicate the Hg reading level on a proportional scale from 4-20 milliamps for connection to certain industrial systems, such as SCADA. A 4 mA current level always corresponds to a Hg reading of $0.5 \mu\text{g}/\text{m}^3$ or less, while a 20 mA current level corresponds to a Hg reading of $500 \mu\text{g}/\text{m}^3$ or higher. Current levels between 4 and 20 mA correspond to Hg readings between 0.5 and $500 \mu\text{g}/\text{m}^3$ on a proportional scale, as determined by this equation:

$$\text{Hg concentration detected} = \frac{[(\text{current in mA} - 4) \times 500]}{16}$$

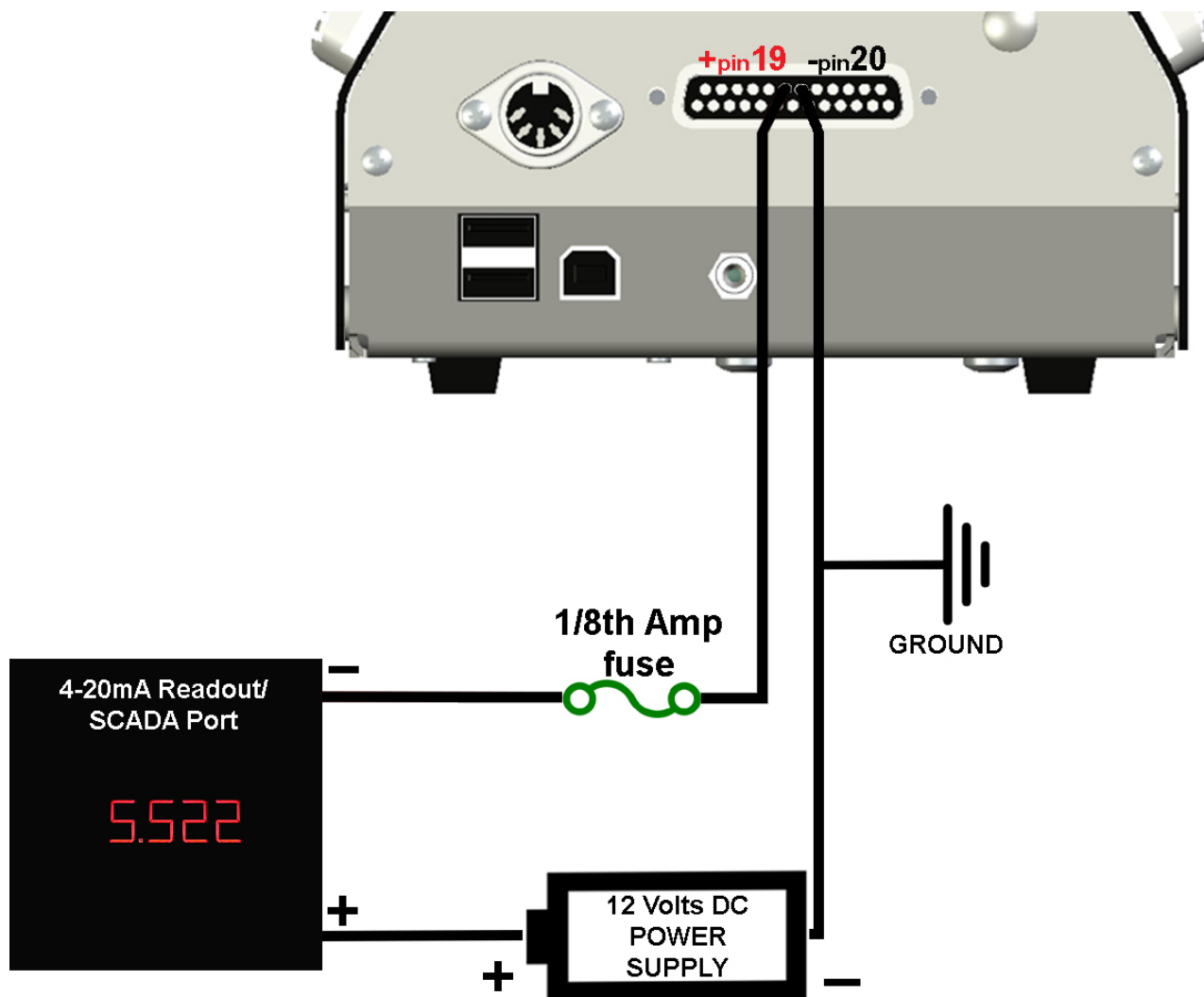
When the J405 is powered off, either manually or automatically, the output current will drop to 3.5mA to indicate this condition. However, if the J405 is operating with the internal battery disconnected and loses AC power, the J405's 4-20mA circuit will continue to output the last current value as long as power to the external current loop is maintained.

The relationship between the Hg concentration detected and the current level present can be represented graphically as follows:



To utilize the 4-20mA output, connect the positive wire of your 4-20mA system to pin 19 of the I/O port on the J405, and the negative wire to pin 20. The number of each pin of the I/O port is labeled on the port itself, and the locations of pins 19 and 20 can also be seen in the diagram below. The 4-20 mA connection is passive and must be powered by an external 12 V DC power supply.

An example setup is shown below.



In this example, the 5.522mA current level displayed above would correspond to a Hg concentration of $47.56 \mu\text{g}/\text{m}^3$.

After configuring your system, the J405 Diagnostics feature can be used to test your setup. When the 4-20mA test portion of the diagnostics is reached, the instrument will output current levels of 4, 8, 12, 16 and 20mA, and the current level displayed on the J405 should match the readout of your 4-20mA system. See **SYSTEM menu** for additional info on running the diagnostics feature. After confirming that the system is configured correctly, use the instrument as normal, and the 4-20mA signal will be output automatically by the J405.

The 4-20mA output is accurate to within $\pm 0.3\%$ of the full scale.

6. MAINTENANCE

Preventive Maintenance Schedule

To keep the Jerome® J405 operating at peak performance, follow the maintenance schedule below as a guide. Since maintenance is more a function of application and amount of use rather than time, your requirements may be different from the listed schedule. Call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com for additional guidance for your environment and operation.

PART/COMPONENT	MAINTENANCE CYCLE	REFER TO PAGE
Charge battery	Depends on usage. See Battery Management section for guidelines.	Page 28
Change .25 inch fritware	Weekly or as needed	Page 33
Change AG Filter ¹	Every 500 samples	Page 34, 35
Change internal filters and tubing ^{1,2}	After 6 months of use or as needed	Page 35
Replace Zero Air Filter ²	Annually	N/A
Factory calibration	Annually	Page 37
Functional check	Monthly or as needed	Appendix B, Page 57
Replace battery	Annually or as needed. The battery pack contains NiMH batteries. Please dispose of properly.	Page 36

FUSE – The J405 utilizes an auto-resetting fuse that does not require care, maintenance or replacement by the user. If the fuse is tripped by electrical power anomalies, it will automatically reset itself once it detects that electrical power conditions have returned to normal.

¹ AG filters contain Sofnolime™. For safety information see the supplier's Material Safety Data Sheet (MSDS) or call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com for a copy. Dispose of all filters properly.

² Zero Air Filters and scrubber filters contain Resisorb®. For safety information see the supplier's Material Safety Data Sheet (MSDS) or call AZI Customer Service at 800-528-7411 or 602-470-1414, or e-mail support@azic.com for a copy. Dispose of all filters properly.

Flow System

The Jerome® J405's flow system is the crucial link between the sensor and the sample. For the instrument to perform correctly, the flow system must be properly maintained. The user maintainable components of this system are the intake filter (.25 inch fritware), an AG Filter, two scrubber filters and connecting tubing. NOTE: Make sure nothing is plugged into the back of the instrument before opening the instrument case.

Check the **Preventive Maintenance** on page 32 for a suggested schedule for changing fritware and internal filters. The Tygon® tubing in the system must be free of crimps for proper flow.

Flow System Parts	Part Number
Scrubber Filter 1 (1 Elbow, 1 Straight Barb)	Z2600 3930
Scrubber Filter 2 (2 Elbow Barbs)	600-0262
AG Filter	600-0293
.25 inch Fritware Filter	2600 3039
Tygon® Tubing - 1/8" I.D. (2')	345-0050

.25 inch Fritware Filter

Replace the .25 inch fritware filter once each week or as needed. In dusty environments, the fritware filter may need to be replaced as often as once a day. Replacement .25-inch fritware filters are available from AZI Consumable Sales at 800-528-7411 or 602-470-1414.

- Make sure nothing is plugged into the back of the instrument, then remove the two (2) side screws from the intake end of the instrument and open the case.
- Gently pull the inner portion of the intake out of the intake port in the direction of the arrow, as shown in Figure 1 below.
- Gently push the old fritware filter disc out of the intake with a small, blunt instrument, as shown in Figure 2 below.
- Place the new fritware onto the inside end of the intake port with the smooth side facing out of the instrument, as shown in Figure 3 below.
- Gently press the inner portion of the intake in the direction of the arrow in Figure 4 to seat the fritware disc firmly against the inner ledge of the intake.
- Once the fritware has been replaced and the inner portion of the intake reinserted, close the case and replace the two (2) side screws removed above.

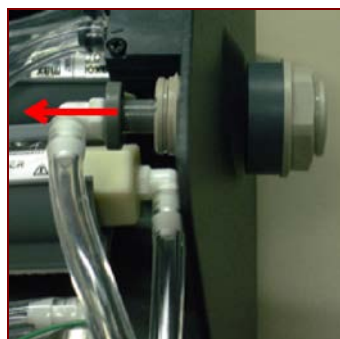


Figure 1

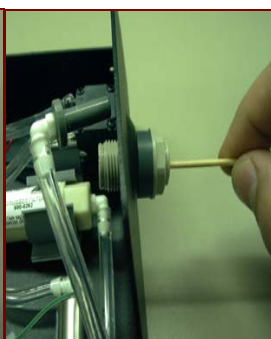


Figure 2



Figure 3

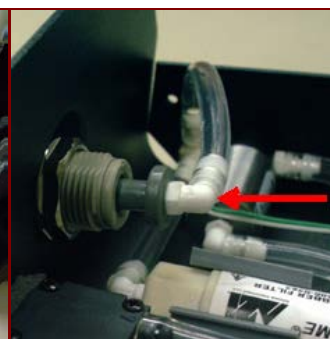


Figure 4

AG Filter Check

The increased sensitivity of the Jerome® J405 requires the replacement of the AG filter (600-0293) every 500 samples to ensure the accuracy of the readings. If your application will require in excess of six (6) months to reach 500 samples, the AG filter should still be changed every six months along with the other internal filters.

To check the AG filter:

- Take 5 samples with Zero Air Filter (Z2600-3905) connected to front of instrument. Readings should decrease with at least 3 of the 5 readings at $0.00 \mu\text{g}/\text{m}^3$. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.
- If readings are not $0.00 \mu\text{g}/\text{m}^3$, then the internal AG filter (600-0293) needs to be replaced. After replacement, the new AG filter will need to be acclimated to the system by performing a sensor regeneration followed by twenty (20) manual samples. See page 35 for filter change instructions.
- **The number of samples can be monitored by viewing the Sensor Stats within the instrument:**

From the MAIN Screen:

- Press the RIGHT arrow button (▶) to enter the main menu.
- Press the DOWN arrow button (▼) to move the cursor to **System**.
- Press the RIGHT arrow button (▶) to select **System**.
- Press the DOWN arrow button (▼) to move the cursor to **View Sensor Stats**
- Press **ENTER/START** to select **View Sensor Stats** on the System menu.
- The screen will display Sensor samples on the last line.

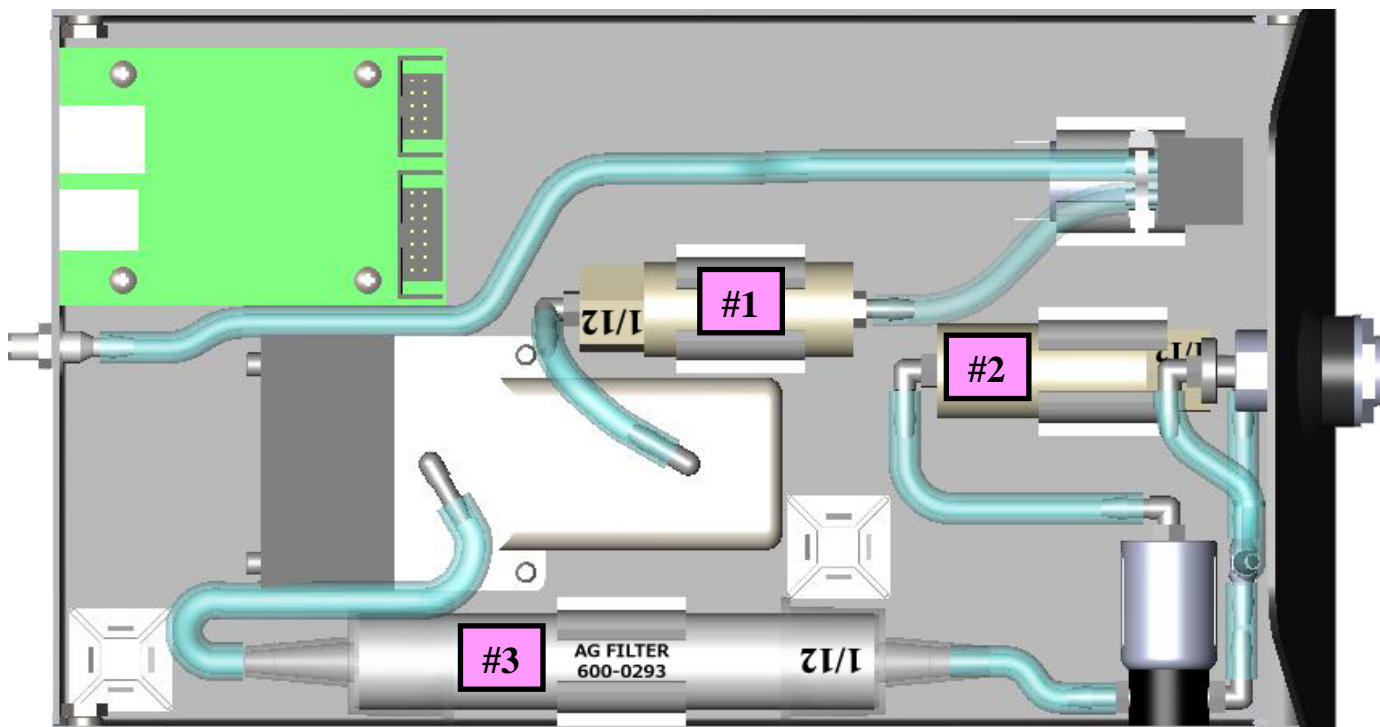
After changing the AG filter, accuracy at $1.0 \mu\text{g}/\text{m}^3$ may change from $\pm 10\%$ to $\pm 20\%$, and accuracy at $25 \mu\text{g}/\text{m}^3$ and $100 \mu\text{g}/\text{m}^3$ may change from $\pm 5\%$ to $\pm 7\%$. RSD is unchanged.



CAUTION:

Internal filters contain either Sofnoline™ or Resisorb®. Used filters will contain trace amounts of Mercury also. Use proper methods when disposing of used filters. Call AZI Customer Service at 800-528-7411, 602-470-1414, or e-mail support@azic.com for a copy of the Sofnoline™ or Resisorb® MSDS or for other questions.





Internal Filters

Part Number

1. Scrubber Filter (1 elbow, 1 straight barb)

Z2600 3930

2. Scrubber Filter (2 elbow barbs)

600-0262

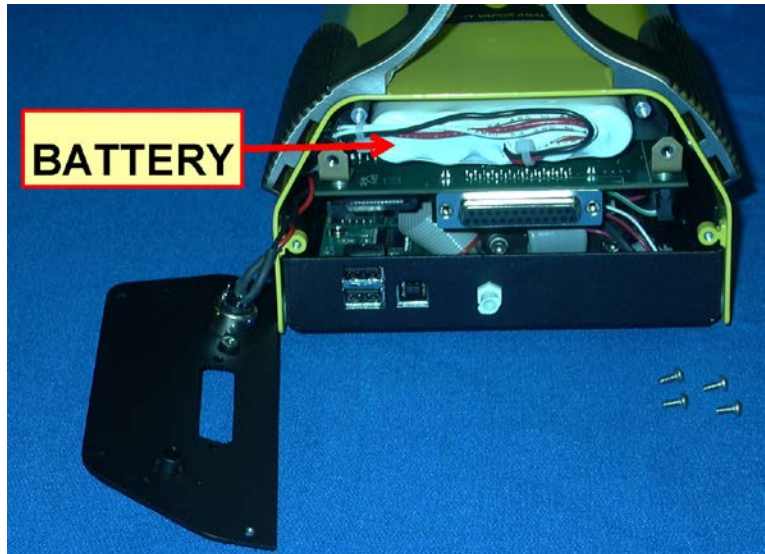
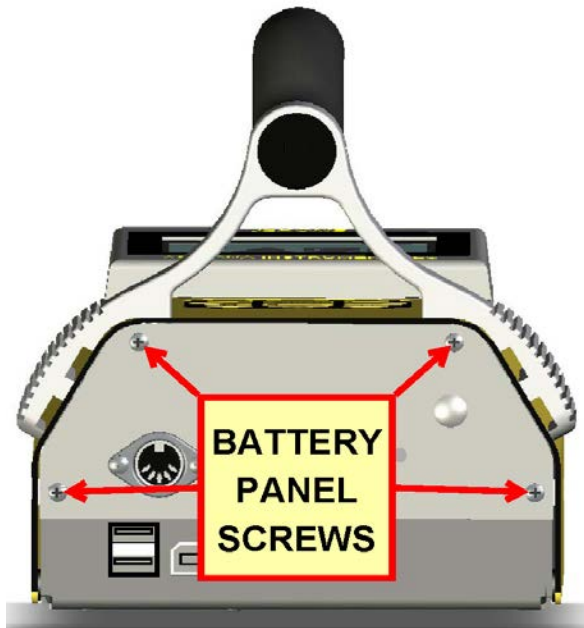
3. AG Filter

600-0293

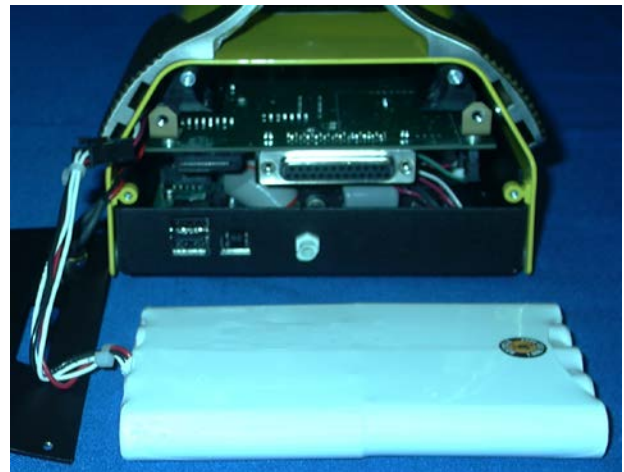
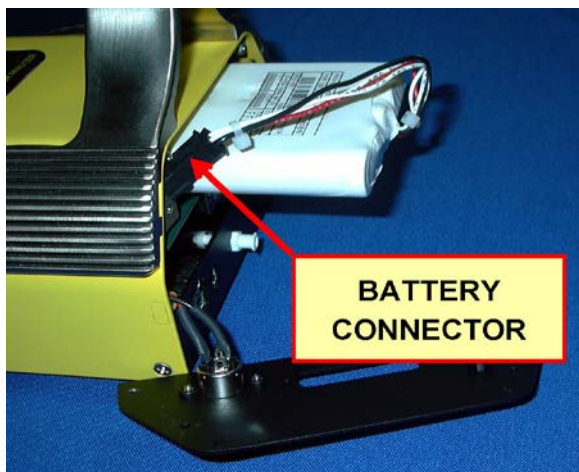
Internal Filters

- Replace the internal filters after six (6) months of use, or as needed.
 - The AG filter should be replaced every six (6) months or every 500 samples, whichever comes first, based on your instrument usage schedule.
- Press the **I/O** button to turn the power OFF and unplug the power cord.
- Remove the two (2) side screws from the intake end of the instrument and open the case.
- Carefully disconnect the Tygon® tubing from both ends of the filters and discard the old filters.
- Replace the old filters with new filters, oriented as shown in the diagram above.
 - Push the Tygon® tubing as far as it will go onto the filter fittings.
 - Note that the marked flow direction on the AG filter goes toward the sensor, or to the left in the diagram above.
- Push the filters into the mounting clips.
- Remove any crimps or twists in the tubing and ensure that tubing connections are secure. If the tubing is loose, readings may not be accurate. Replace any tubing that has deteriorated due to heat and/or age.
- Close the case and replace the screws.
- If the AG filter is replaced, the new filter must be acclimated to the system by performing a sensor regeneration, followed by twenty (20) manual samples using the sample button. See page 23 for sensor regeneration instructions.
- Dispose of all filters in accordance with state and federal environmental regulations.

Replacing the Battery Pack



- Press the **I/O** button to turn the power OFF.
- Unplug the power cord.
- Use a Phillips screwdriver to remove the four (4) screws securing the battery panel as shown above.
- After removing the screws, carefully set the panel to the side. Note that it is still connected to the instrument via the power connector.
- Slide the battery pack out of the J405.
- Disconnect the battery connector to detach the old battery.
- Install the new battery by connecting it to the battery connector and sliding it into the J405.
- Tuck any excess cabling into the gap between the battery and the case.
- Replace the battery panel and secure with the four (4) screws removed above.
- Dispose of the old nickel metal hydride (NiMH) battery in accordance with state and federal regulations.
- After battery replacement, the date and time will need to be updated. See the **SYSTEM menu** on page 20 for directions. Sample data is stored in non-volatile memory and will not be lost or affected when the battery is disconnected or replaced.



7. CALIBRATION

Factory Calibration Service

The Jerome[®] J405's gold film sensor is inherently stable and does not require frequent calibration. The interval between calibrations depends upon the application and frequency of use; however, the recommended interval is every 12 months.

The Jerome[®] J405 has been factory calibrated using laboratory equipment containing NIST traceable permeation tubes. In order to calibrate the Jerome[®] J405, a sophisticated calibration system is required that ensures stability of the calibration gas source, eliminates any pressure in the calibration gas stream, and controls the temperature of the calibration environment.

We strongly recommend you take advantage of our calibration and maintenance service at Arizona Instrument. Service includes filter replacement, component testing, and instrument calibration to NIST traceable standards. A certificate of calibration is issued from AZI when your instrument is factory calibrated.

For scheduling and shipping authorization, call AZI Customer Service at (800) 528-7411 or (602) 470-1414, or visit our website at www.azic.com.

Verification of Functionality

The Functional Test Kit (FTK), AZI P/N Y431 0902, is used to verify that your instrument is functioning correctly between recommended annual factory calibrations. It allows you to have complete confidence in the sample results. This test verifies proper instrument operation through the introduction of a known concentration of mercury vapor into the Jerome[®] analyzer.

**THIS IS A FIELD CHECK OF THE FUNCTIONALITY OF THE INSTRUMENT.
THIS TEST DOES NOT CALIBRATE THE INSTRUMENT.**

If your application requires frequent verification of instrument function, this test demonstrates the instrument's proper operation and function. Recording FTK results in an instrument log provides a quality control/quality assurance record of instrument function between regular calibrations. If test results fall within the expected range, you may assume the instrument is functioning correctly.

See **APPENDIX B – J405 FUNCTIONAL TEST KIT** on page **57** for more information about the FTK procedures. Complete instructions for use are supplied with the test kit, AZI P/N Y431-0902.

To order the FTK, contact your AZI Sales Representative at (800) 528-7411 or (602) 470-1414.

8. J405 TROUBLESHOOTING

Symptom	Possible Cause	Solution
Power Problems		
Instrument does not turn ON.	Discharged battery or	Recharge battery for a minimum of 3 hours. Refer to page 28 .
Battery will not hold a charge.	Dead battery.	Replace battery. Refer to page 36 .
Instrument does not turn on when connected to AC power supply/charger.	Open fuse. Insufficient power. Internal component failure.	Wait for fuse to automatically reset itself. Use a voltmeter to verify there is power to the AC outlet. Call AZI Customer Service for information at 800-528-7411 or 602-470-1414.
Sampling Problems		
Airflow is restricted during the sensor regeneration cycle, causing possible permanent damage.	Kinks and crimps in the Tygon® tubing. Obstructed intake or exhaust. Clogged intake filter	Periodically check the Tygon® tubing in the instrument. Refer to page 35 . Verify ports are not obstructed. Change intake fritware filter. Refer to page 33 .
High erratic results.	Internal mercury vapor contamination.	1. Install Zero Air Filter in intake. Press SAMPLE button. After three samples, if readings are over 2 µg/m ³ , replace fritware filter and Tygon® tubing. Refer to page 33 . 2. Perform sensor regeneration with the Zero Air Filter in intake. Refer to page 23. Retest if necessary. Replace scrubber filters and Tygon® tubing. Refer to page 33 .
High or erratic results	Intake and internal filters may become clogged and need replacement when sampling in a dusty area.	1. Open instrument and check for pinched, crimped or disconnected internal tubing. 2. In extreme conditions, an additional particle filter may be installed on the intake.

Symptom	Possible Cause	Solution
Low response or erratic readings after a long period of non-use.	May need a second regeneration cycle.	<ol style="list-style-type: none"> 1. Wait 30 minutes and perform another sensor regeneration. 2. Test with FTK. Refer to page 57. 3. If still unresponsive, call AZI Customer Service at 800-528-7411 or 602-470-1414 for assistance.
False readings	Extremely cold or extremely warm air sampled into unit.	<p>If sampling under these conditions, install Zero Air Filter in intake. Sample every 15 seconds until the display reads 2 µg/m³ or less to equilibrate sensor temperature with the temperature of the sample air stream. Remove filter and take samples.</p> <p>or</p> <p>Run the Warm-up as described in the REGEN menu.</p>
Display Warnings and Error Messages		
Sensor Failure		Call AZI Customer Service at 800-528-7411 or 602-470-1414.
Sensor out of Range	The sensor resistance has changed.	Call AZI Customer Service at 800-528-7411 or 602-470-1414.
Data Memory Full	Data memory full	Save and then delete data. See Retrieving Data on page 29 .
External Power Required to Regen	Power from the AC adapter, external battery or car adapter is required to regenerate the sensor.	Connect external power and restart the regeneration.
Incomplete Regen. Check battery/AC power supply.	External power was interrupted before regeneration could complete.	Reconnect external power, allow sensor to cool, then restart regeneration.
Regen High Temp Error. Incomplete Regen.	Sensor temperature too high during regeneration.	Allow sensor to cool, then restart regeneration.
Sensor Regeneration Required	Sensor is saturated with mercury.	Perform Sensor Regeneration. See page 23 .
A USB Printer is not responding or not connected.	The instrument has not received a response from the printer in over 30 seconds.	Turn the printer off and back on, and make sure the printer is connected to the J405 and online.

Symptom	Possible Cause	Solution
No USB Drive is connected or USB Drive is full.	USB drive not connected or USB drive full	Make sure space is available on USB drive and drive is connected.
Battery Fault	<ol style="list-style-type: none"> 1. Turn off the J405, then disconnect the AC power supply/charger from the J405. 2. Turn the J405 back on, then reconnect the AC power supply/charger to the J405. 	
Calibration due soon		Call AZI Customer Service at 800-528-7411 or 602-470-1414 to schedule factory calibration.
Calibration past due		Call AZI Customer Service at 800-528-7411 or 602-470-1414 to schedule factory calibration.
High Concentration	Sampled mercury concentration is greater than $999.9\mu\text{g}/\text{m}^3$.	

Potential Interferences

Potential interferences to the Jerome[®] mercury vapor analyzers are rare and most of these can be eliminated with proper maintenance procedures. However, erroneously high readings can sometimes occur. Here are a few things to be aware of when using the instrument:

The gold film sensors used in the Jerome[®] mercury vapor analyzers do not respond to the following compounds:

- Hydrocarbons
- CO, CO₂, and SO₂
- Water vapor (Note that water vapor condensation on the gold film can cause irreparable harm to the sensor and must be avoided.)

The AG filter (AZI P/N: 600-0293), an acidic gas filter contained in the internal filter system, removes the following compounds that cause the gold film sensor to respond:

- Chlorine
- NO₂
- Hydrogen Sulfide (H₂S)
- Most mercaptans (organic sulfur compounds or “thiols”)

In areas containing these highly volatile compounds, the filter can quickly become saturated. In such situations, it is recommended that these gases be allowed to dissipate before sampling for the less volatile, more persistent mercury vapor. In addition, a special filter designed to remove chlorine gas from the sample stream is available from Arizona Instrument and may be ordered as Chlorine Filter, AZI P/N Z2600-3940.

Ammonia in very high concentrations can cause an off-gassing of accumulated acidic fumes from the internal acidic gas filter, resulting in positive readings on the instrument. In these cases, the ammonia odors are very strong. A special filter designed to remove ammonia gas from the sample stream is available from Arizona Instrument and may be ordered as Ammonia Filter, AZI P/N 990-0193. Again, either allow the vapors to dissipate or use the ammonia filter. Filter replacement at regular intervals, or when unexpectedly high readings are encountered in areas of these potential interferences, may resolve these problems.

Visit the “Tech Notes” section at www.azic.com for more information concerning the chlorine and ammonia filters.

Volatile mercury compounds in general will cause the gold film to respond. Alkyl organic mercuries such as methyl mercury (and other “straight chained” compounds) are typically extremely volatile and change the electrical resistance of the gold film sensor. Any such responses should be considered “qualitative,” **not** quantitative. The instruments are designed and calibrated to elemental mercury vapor only.

Inorganic mercury salts such as mercuric chloride are not very volatile. However, they may generate some minute level of elemental mercury vapor to which the instruments will respond. This response, again, should be considered a qualitative response only.

9. ACCESSORIES & MAINTENANCE PARTS

PART #	ITEM DESCRIPTION
Y405-0901	J405 Accessory Kit, Communications Package Instruments (See pictures beginning on page 43)
	1400 2002 Probe
	1400 3010 Tubing Adapter, 1/4" to 1/8"
	2600 3039 Filter, Fritware, 0.25" (1 pack of 20 fritware filters)
	Z2600 3905 Filter, Zero Air Filter
	200-0165 USB Cable, Type A to Type B, 6 ft.
	990-0219 USB Memory Stick
	4000-1025 AC Adapter Power Supply (power supply/charger)
	6000 4003 Line Cord, 115 VAC - USA and Canada
alternate	200-0003 Line Cord, 220-240 VAC – England
alternate	200-0008 Line Cord, 220-240 VAC – Europe
Y405-0904	J405 Accessory Kit, Non-Communications Package Instruments (See pictures beginning on page 43)
	1400 2002 Probe
	1400 3010 Tubing Adapter, 1/4" to 1/8"
	2600 3039 Filter, Fritware, 0.25" (1 pack of 20 fritware filters)
	Z2600 3905 Filter, Zero Air Filter
	4000-1025 AC Adapter Power Supply (power supply/charger)
	6000 4003 Line Cord, 115 VAC - USA and Canada
alternate	200-0003 Line Cord, 220-240 VAC - England
alternate	200-0008 Line Cord, 220-240 VAC - Europe
Y431-0902	J405 Functional Test Kit (See pictures beginning on page 43)
	A2600 0902 Stopper Assembly
	A2600 0903 Syringe Assembly
	A2600 0904 Mercury Vial
	2600 0022 Syringe Needles, 22 Ga. Reusable
	2600 0030 FTK Vessel, Thermos
	3200 0011 Septa (20)
	Z2600 3914 Septum Holder
Y405-0903	J405 Maintenance Kit (See pictures beginning on page 43)
	345-0050 2' of 1/8" Tygon® tubing
	2600 3039 Filter, Fritware, 0.25" (1 pack of 20 fritware filters)
	Z2600 3905 Filter, Zero Air Filter
	600-0293 Filter, AG Filter
	Z2600 3930 Filter, Scrubber Filter
	600-0262 Filter, Scrubber Filter with 2 elbows

990-0217

Hard Side Carry Case

Includes a molded case with die cut foam rubber inserts to hold the Jerome® J405 and accessories.



990-0220

Soft Side Carry Case

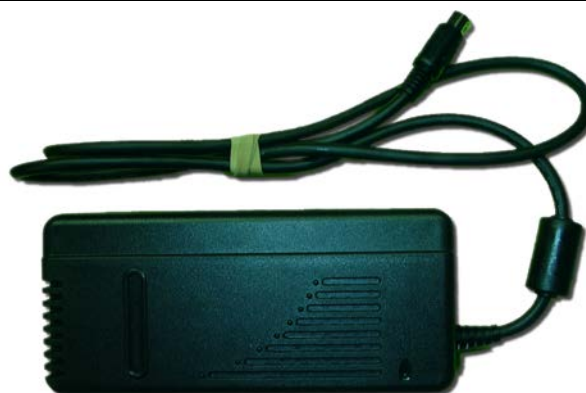
Includes a shoulder strap for easy carrying, a clear plastic window over the instrument display, and pockets to hold supplies or accessories.



Spare Parts and Accessories

4000-1025

**AC Adapter Power Supply
(supply/charger)**



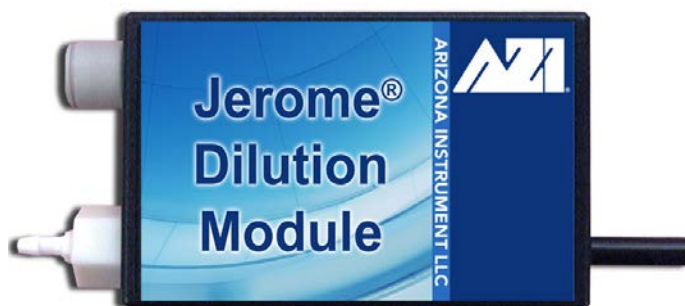
200-0143 Battery Pack Assembly



200-0170 Car Accessory Cable



990-0225 10-to-1 Dilution Module



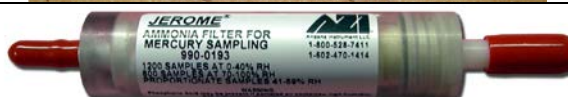
990-0214 External Battery Pack



600-0293 Filter, AG Filter



990-0193 Filter, Ammonia Filter



Z2600 3940	Filter, Chlorine Filter	
2600 3039	Filter, Fritware, .25 inch (pack of 20)	
Z2600 3930	Filter, Scrubber Filter	
600-0262	Filter, Scrubber Filter with 2 elbows	
Z2600 3905	Filter, Zero Air Filter	
6000 4003 (200-0003) (200-0008)	Line Cord (100-120 VAC) (220 VAC Line Cord – UK) (220 VAC Line Cord – Europe)	
Y990-0098	Printer Kit	
1400 2002	Probe	
3200 0011	Septa	
Z2600 3914	Septum Holder	

A2600 0902	Stopper Assembly	
A2600 0903	Syringe Assembly	
2600 0022	Syringe Needles, 22 Ga.	
1400 3010	Tubing adapter	
345-0050	Tygon® tubing 1/8" I.D. (1 foot)	
200-0165	USB Communication Cable (Type A to Type B)	
990-0230	USB Keyboard	

**For current prices and delivery information, call AZI Customer Service at
(800) 528-7411 or (602) 470-1414.**

10. APPENDIX A – USB/HYPERTERMINAL SETUP

Installing the J405 USB Driver

Note: The AZI USB Driver is compatible with Windows® XP (32-bit), Windows® Vista (64-bit) and Windows® 7 (32 and 64-bit). However, the HyperTerminal program is only included in Windows® XP.

If the Jerome® J405 CD is available:

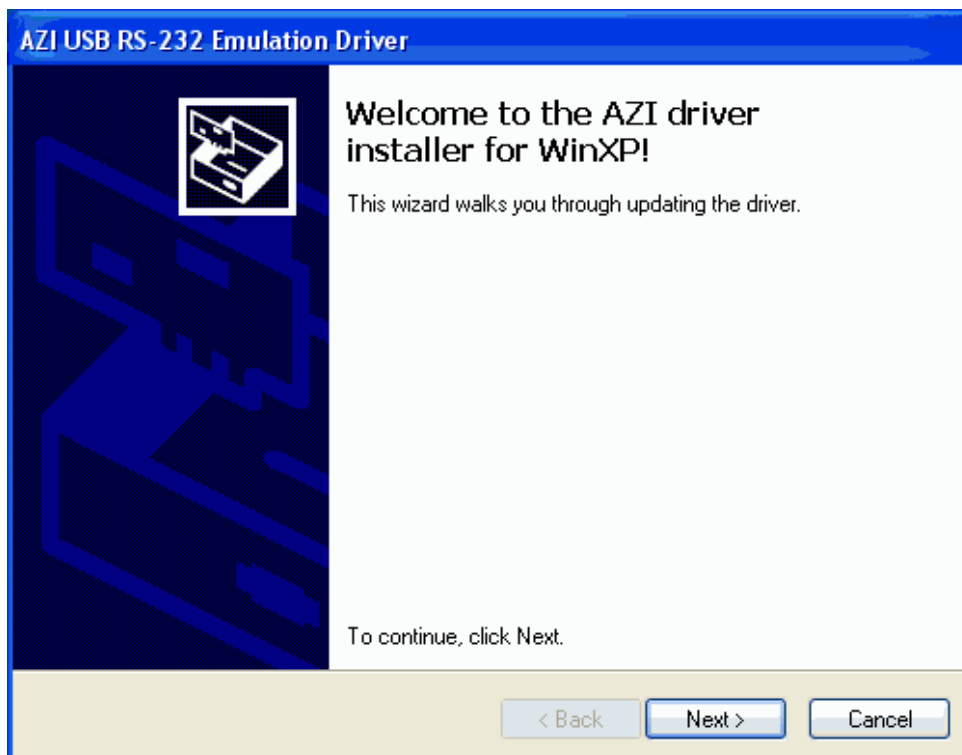
- Insert the CD in the PC's CD-ROM drive.
- Use Windows® to browse to the CD, locate the driver file (AZI_USB_Driver.zip), and copy it to your desktop.

If the CD is not available:

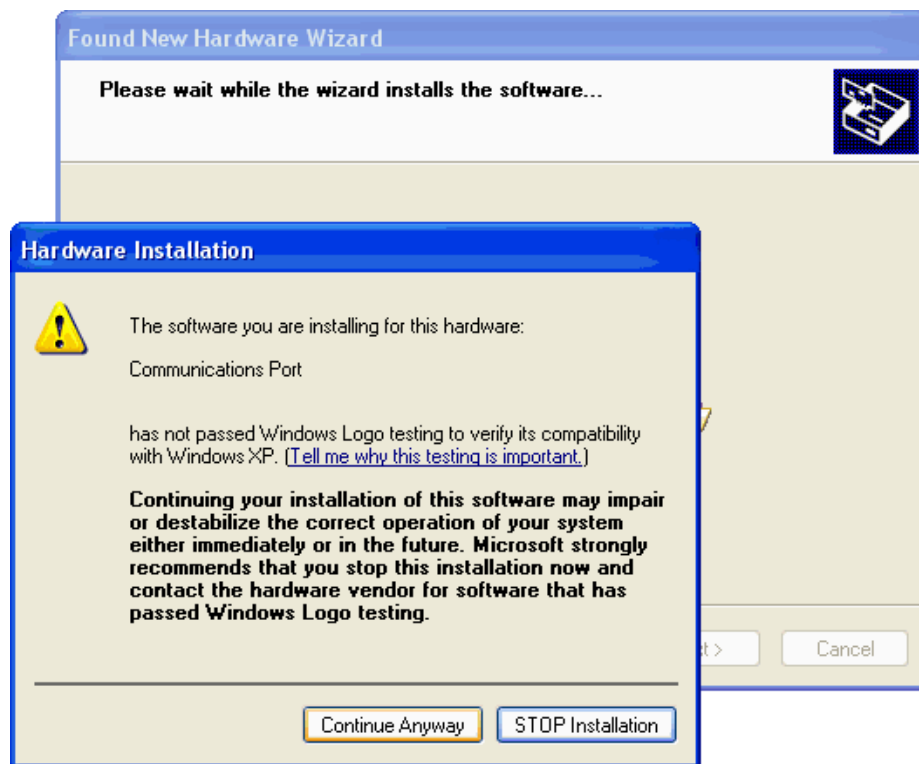
- Download the driver file from the Support tab at <http://www.azic.com> and save it to your desktop. If you received these instructions and the driver in an email, save the attached file (AZI_USB_Driver.zip) to your desktop.

Once the driver file (AZI_USB_Driver.zip) is on your desktop:

- 1) Launch the AZI Driver Installer wizard:
 - Double-click the file to open it.
 - Drag the “Driver Install” directory from the zip file to the desktop.
 - Double-click the “Driver Install” folder to open it.
 - Double-click the “Install Driver” shortcut to launch the AZI Driver Installer wizard.
- 2) Follow the instructions in the AZI Driver Installer wizard. Click Next.
(The description and screenshots pictured are for installation in Windows® XP. Windows® Vista and Windows® 7 installations will be similar.)



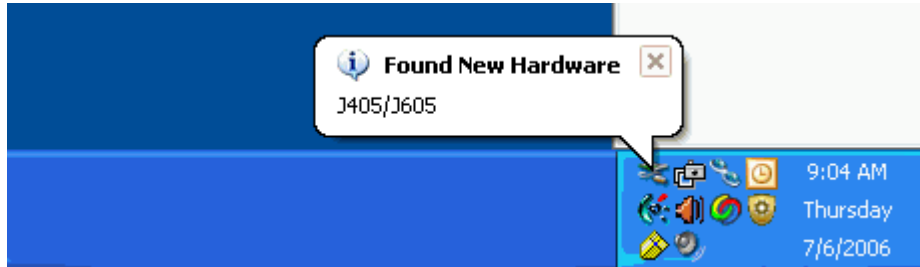
- 3) Windows® may display one or more messages indicating that the driver has not passed Windows® Logo Testing. This driver being installed is a generic Communications Port driver that is part of Windows® (usbser.sys), so it is safe to ignore this warning. Click “Continue Anyway” to install the driver.



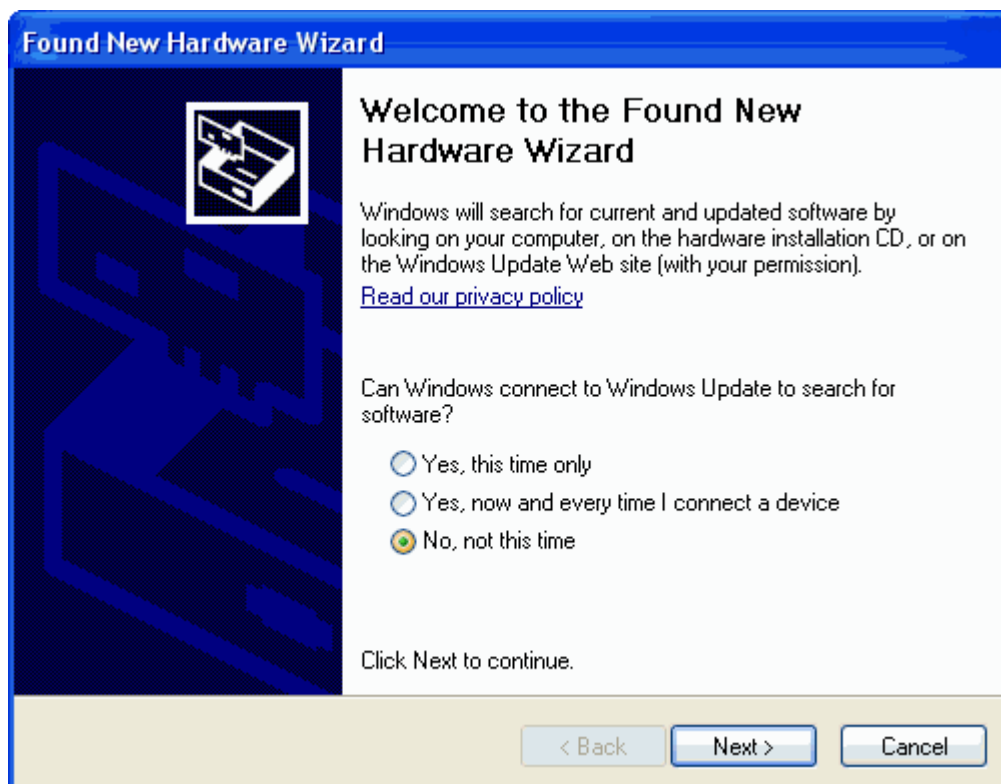
- 4) Click Finish.



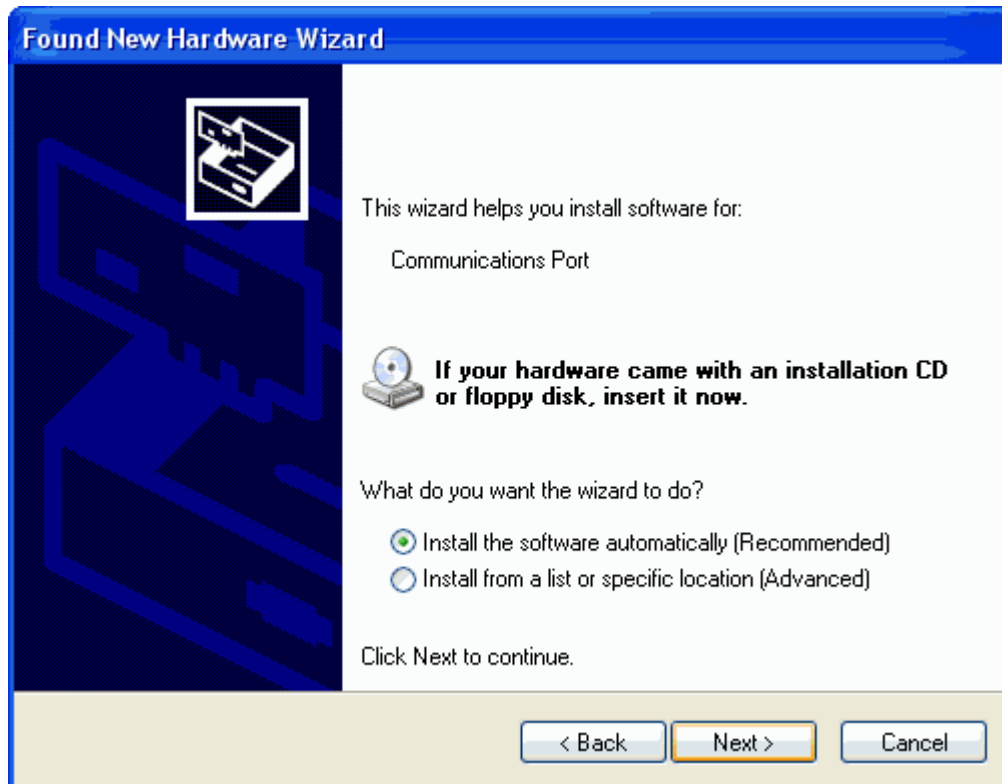
- 5) Power on the J405 and connect it to the target computer using the included USB cable (AZI P/N: 200-0165). Windows® will detect the J405 and its Communications Port and automatically start the New Hardware wizard. The following pictures and descriptions correspond to a Windows® XP installation. (If using Windows® Vista or Windows® 7, this process is abbreviated and requires minimal user interaction. Watch for the two info balloons to appear and then proceed to page 52.)



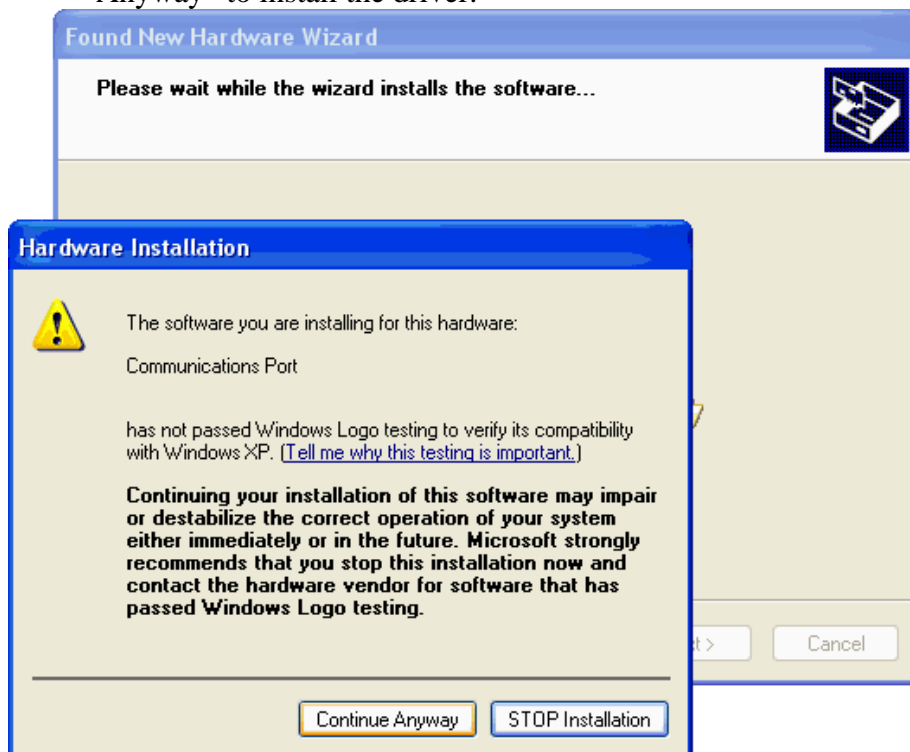
- 6) If the following dialog box appears, **DO NOT** connect to Windows® Update to get the driver. Select "No, not this time" and click Next.



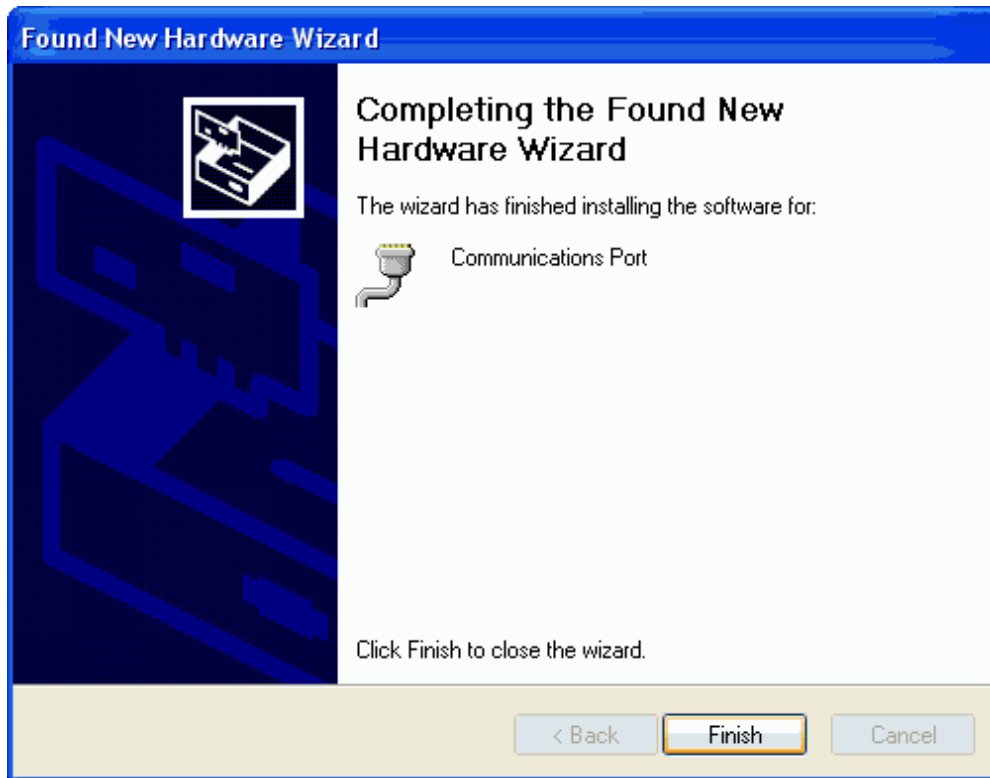
- 7) Select “Install the software automatically”, and click Next.



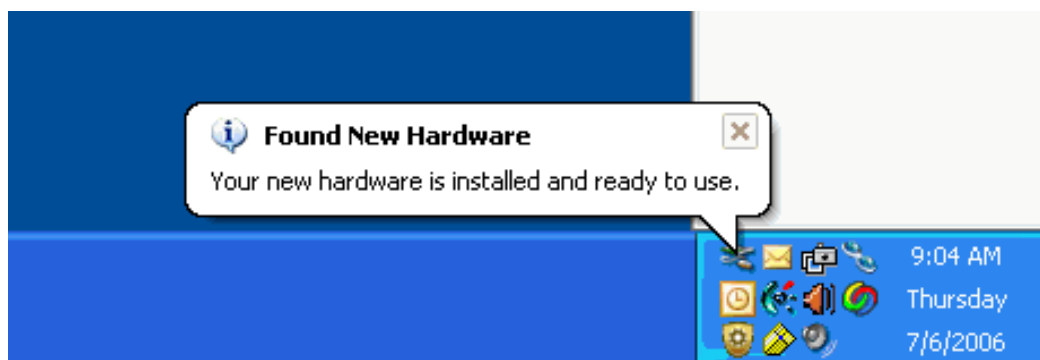
- 8) Windows® may display a message indicating that the driver has not passed Windows® Logo Testing. This driver being installed is a generic Communications Port driver that is part of Windows® (usbser.sys), so it is safe to ignore this warning. Click “Continue Anyway” to install the driver.



9) Windows® will copy a file and finish the wizard. Click Finish.

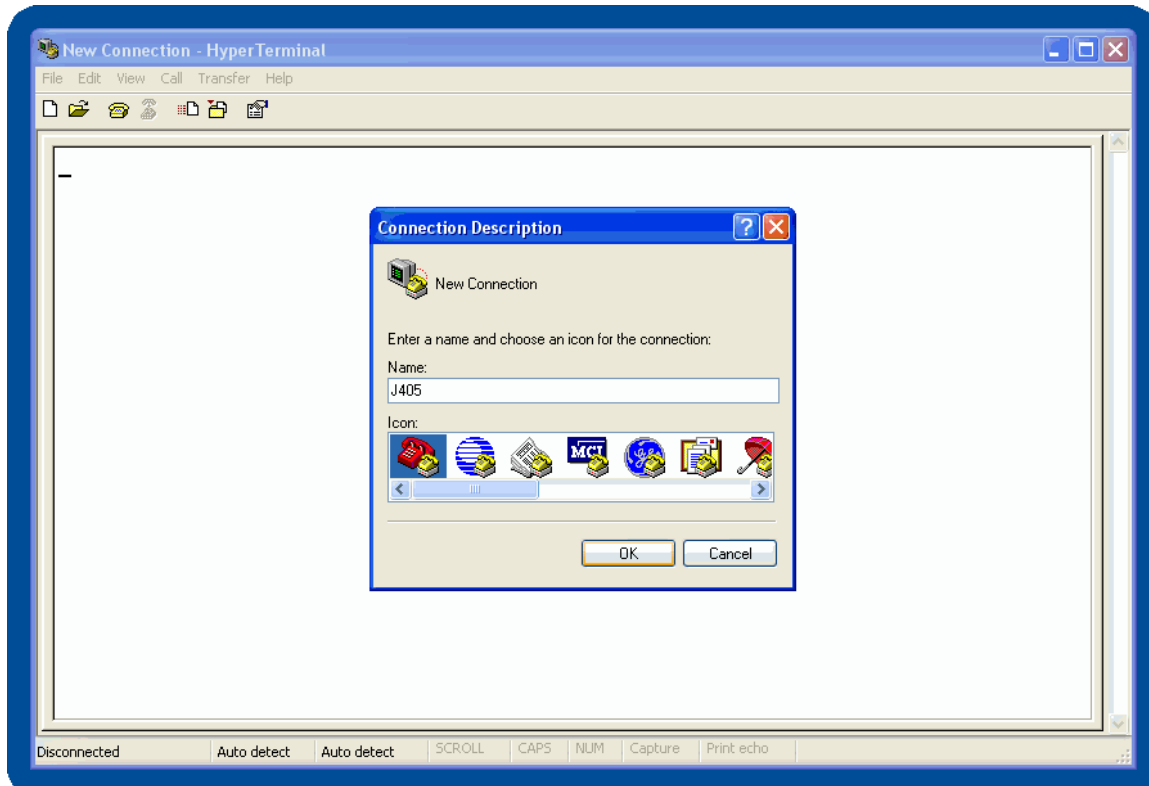


10) Windows® will then indicate that the driver has been successfully installed.



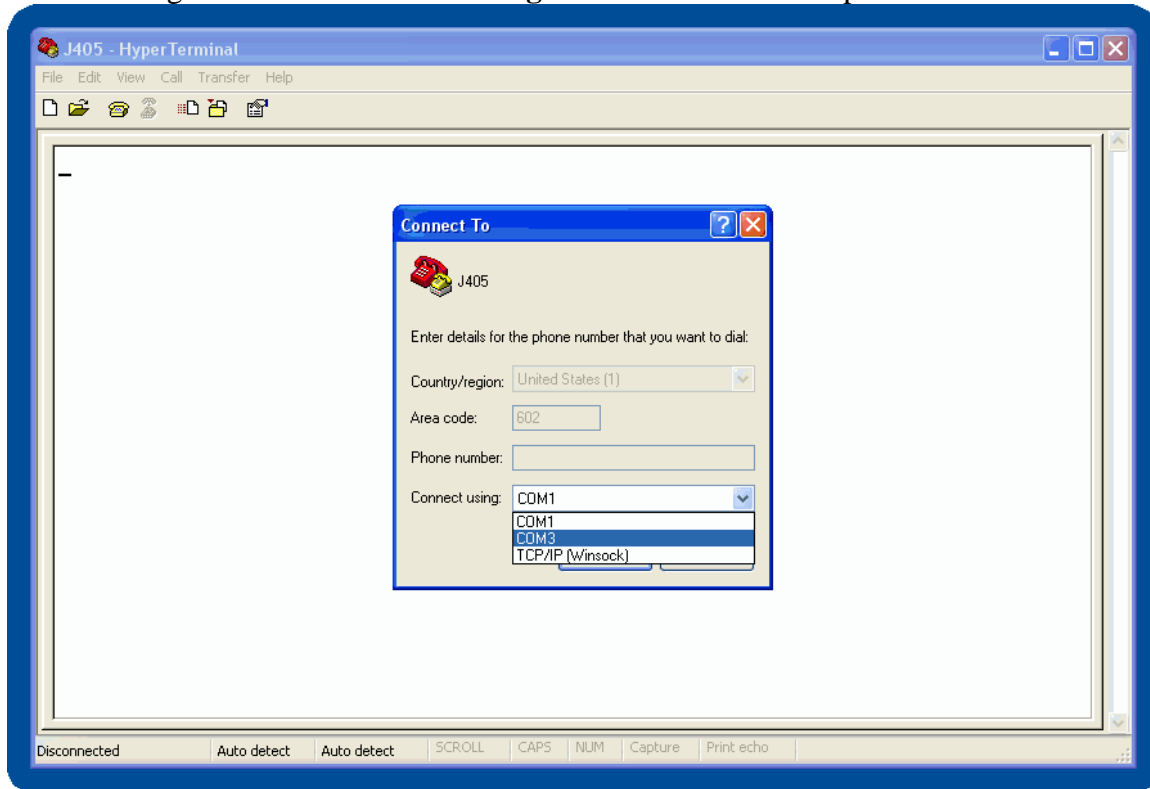
Using HyperTerminal to receive data from the J405

- 1) The J405 should be connected to the PC's USB port and powered on before HyperTerminal is launched or HyperTerminal may not see the COM port in use.
- 2) Start HyperTerminal (Start → All Programs → Accessories → Communications → HyperTerminal). If prompted to make HyperTerminal the default telnet application, click **No**.
- 3) When prompted for a name for this connection, enter **J405** and click **OK**.

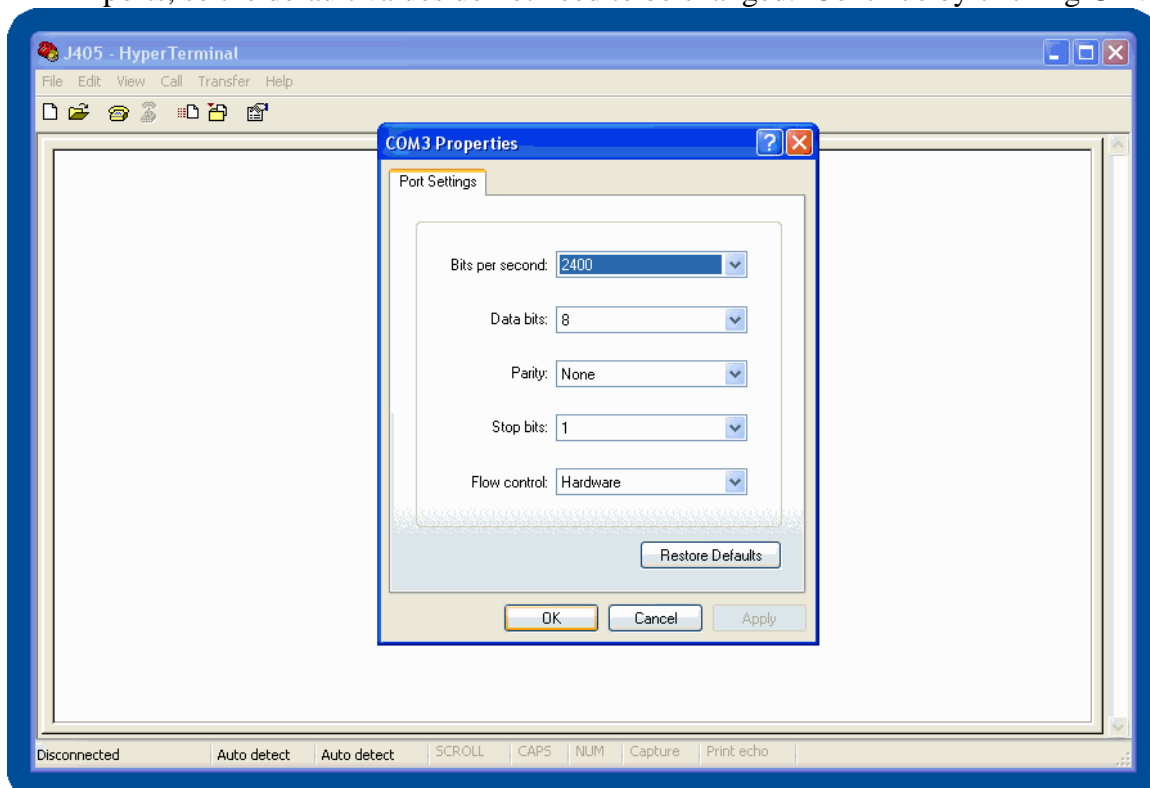


- 4) If HyperTerminal has not been run previously on the target PC, it will ask for an area code, etc. Enter that information as appropriate and click **OK**.

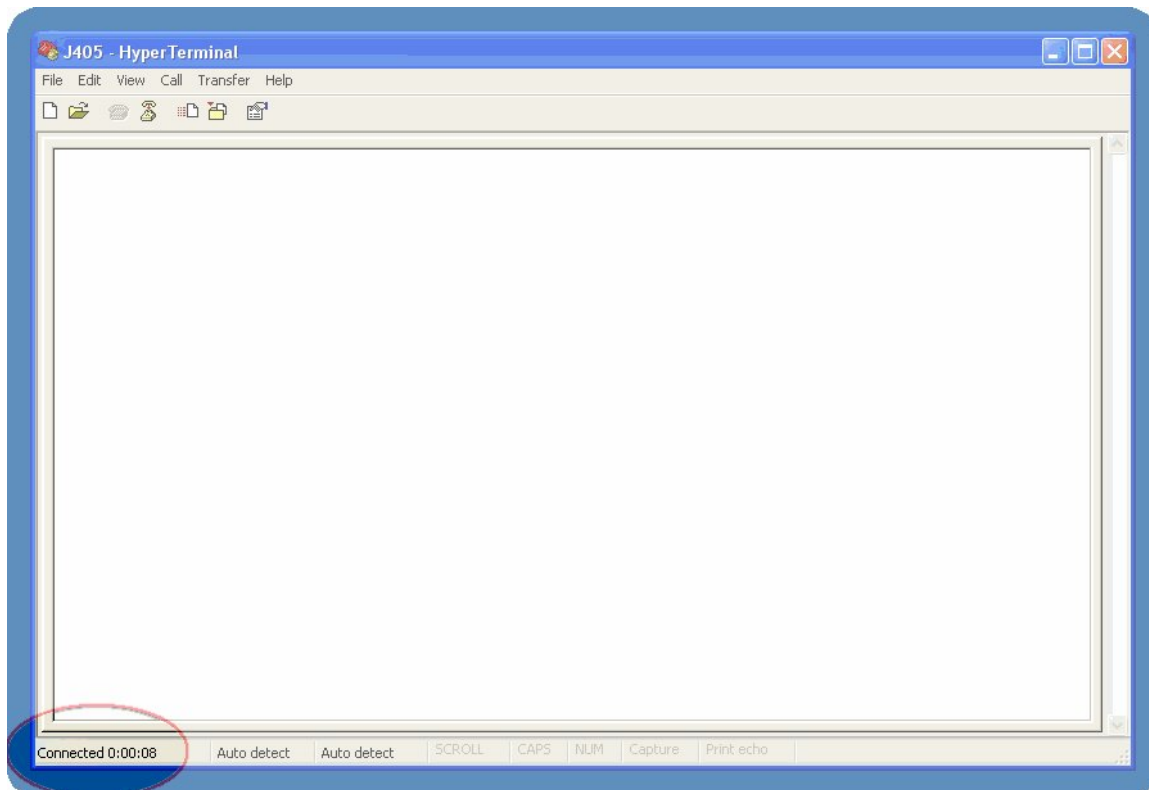
- 5) Next, a window labeled **Connect To** will be displayed. Find the last dropdown list in the dialog box labeled **Connect using:**. Select the last COM port from the list and click **OK**.



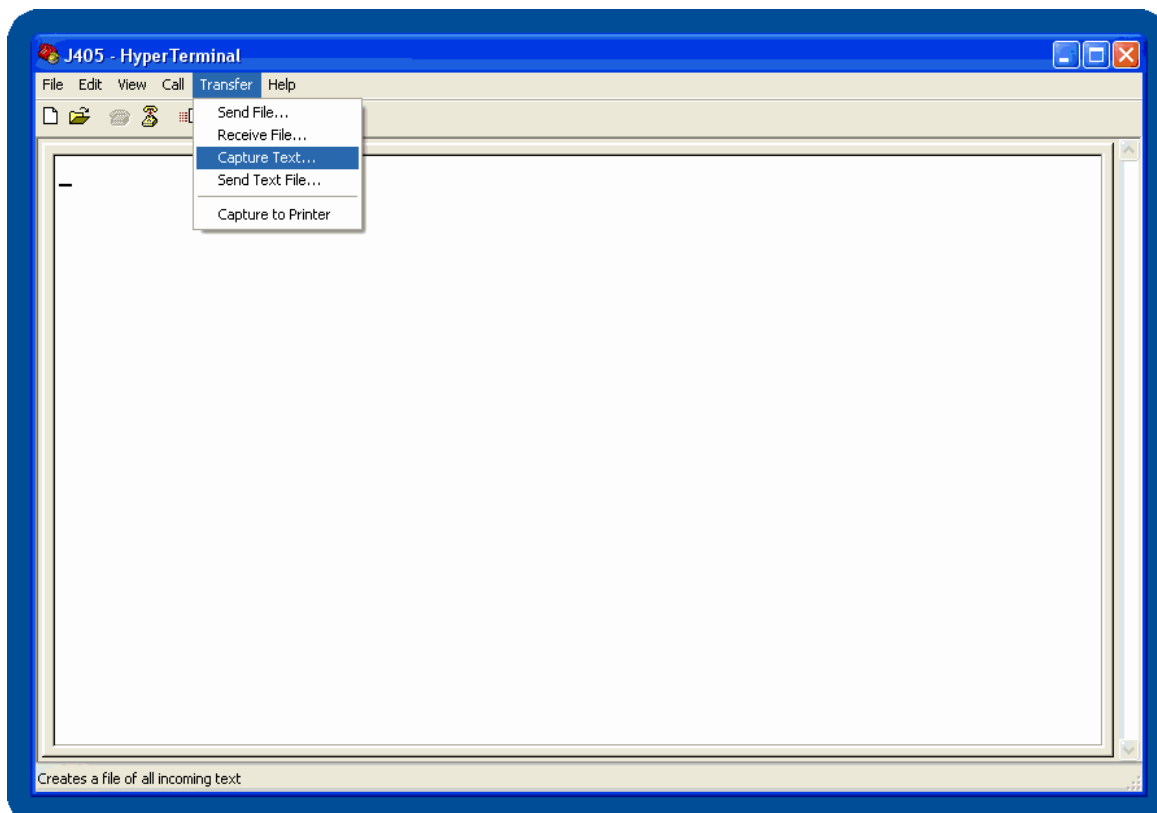
- 6) Next, HyperTerminal will prompt for Port Settings. These settings do not apply to USB ports, so the default values do not need to be changed. Continue by clicking **OK**.



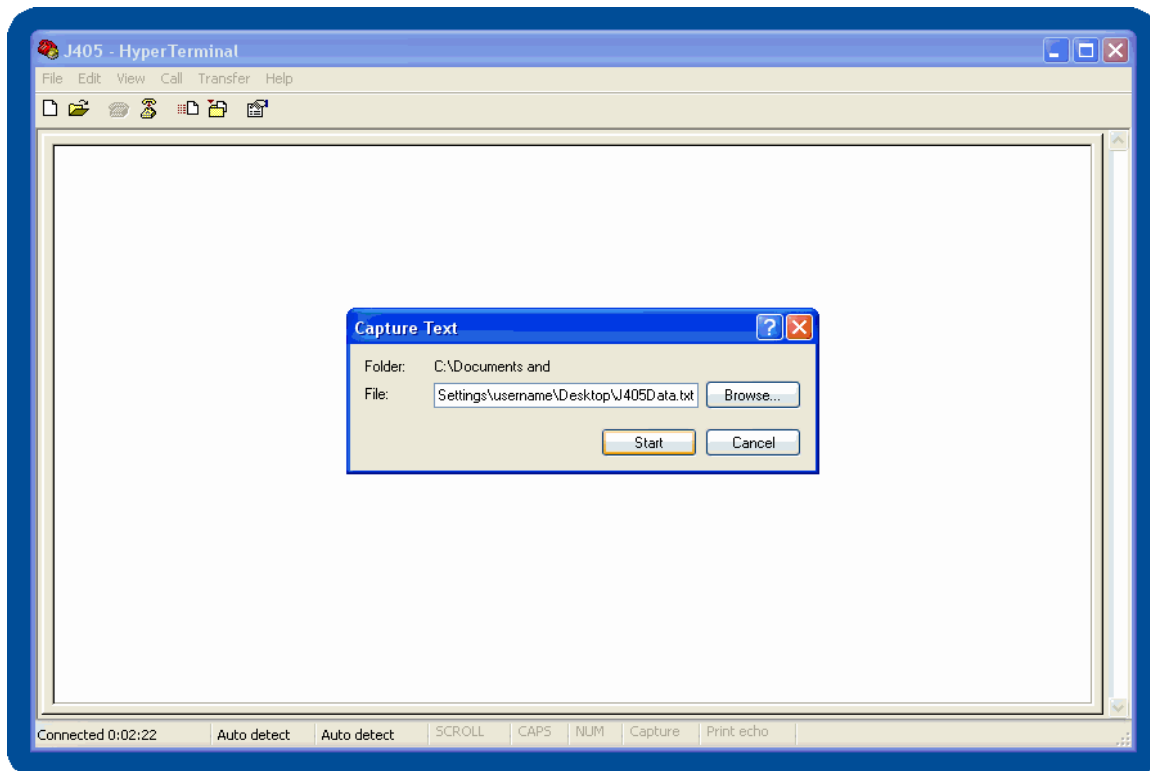
- 7) A blank HyperTerminal screen will be displayed. On the status bar in the lower left hand corner it should say **Connected**.



- 8) Select **Capture Text...** from the **Transfer** menu on the main HyperTerminal window.

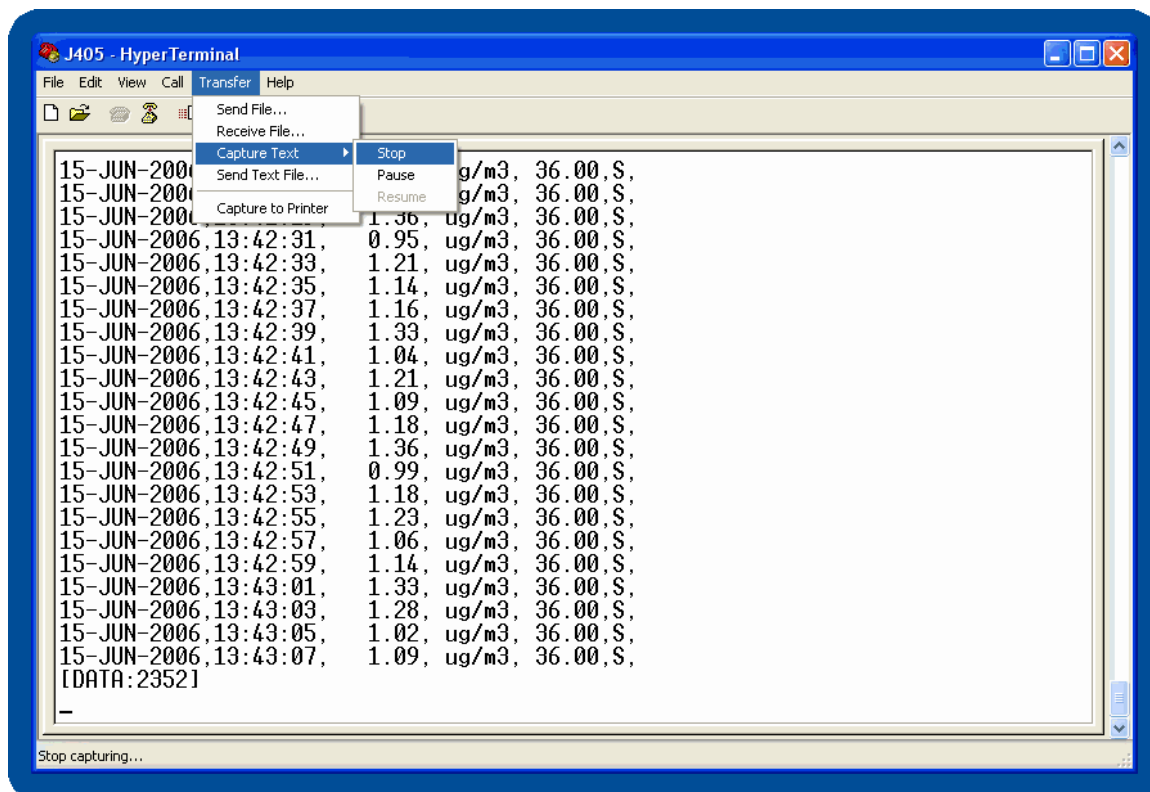


- 9) HyperTerminal will prompt for a file to save the data to. It is recommended that the data be saved to either the Desktop or My Documents.



- 10) Go to the J405 and navigate to the **DATA** menu, then highlight **Send to PC** and press **ENTER/START**.
- 11) You should see your data scrolling in the HyperTerminal window. If you do not see anything in the HyperTerminal window, go to step 13).

12) When the J405 stops sending data, Click HyperTerminal's **Transfer** menu again and click **Capture Text**, then **Stop**



13) If you did not receive any text from the J405:

- Go to the **Call** menu, click **Disconnect**
- Go to the **File** menu, click **Properties**
- You will see the same window as in step 4) above. Try selecting a different COM port and continue from step 4). Keep trying each COM port in the list. If you have tried all of them and still cannot receive data from the J405, try re-installing the J405 USB driver. If that does not solve the problem, call AZI Customer Service at 800-528-7411 or 602-470-1414 or email support@azic.com.

See **Retrieving Data** on page 29 for an explanation of the fields in the data file.

11. APPENDIX B – J405 FUNCTIONAL TEST KIT

If your application requires frequent verification of instrument functionality, this test will benefit you. If the test results fall within the expected range, you may assume the instrument is functioning properly.

THIS IS A FIELD CHECK OF THE FUNCTIONALITY OF THE INSTRUMENT.

THIS TEST DOES NOT CALIBRATE THE INSTRUMENT.

Testing with the Functional Test Kit (FTK) should always be done with the instrument set to display in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). If your instrument is displaying results in milligrams per cubic meter (mg/m^3), switch to $\mu\text{g}/\text{m}^3$ by selecting Units from the **SAMPLE menu**, before doing any testing with the FTK. See **SAMPLE menu** on page 15 for more information on changing the display units.

NOTE: Perform the functional test ONLY after a sensor regeneration.

The J405 Functional Test Kit contains all accessories necessary to perform the functional test. See the complete list on page 42 and verify that all the parts to the kit are present.

CAUTION:

The vial and thermometer contain liquid mercury and are possible sources of mercury contamination. Follow the instructions for handling or transferring the mercury into the Functional Test Kit Vessel carefully.

For safety information, see the supplier's Material Safety Data Sheets (MSDS) or call AZI Customer Service at 1-800-528-7411 or 1-602-470-1414 for assistance in obtaining the MSDS.

Preparation

- Carefully unpack and inspect the parts of the kit.
- ENSURE that the mercury shipping container and mercury filled thermometer are not broken.
- In a ventilated area, preferably under a fume hood, remove the mercury vial from its shipping container.
- Place the functional test kit vessel and the mercury vial close to each other and open the mercury vial.

Mercury Transfer

- CAREFULLY pour the mercury into the center of the functional test kit vessel's opening.
 - ENSURE that no mercury residue is on the outside of the vessel. See the supplier's Material Safety Data Sheets (MSDS) or call AZI Customer Service at 1-800-528-7411 or 1-602-470-1414 for clean-up instructions.
- INSTALL the stopper assembly into the functional test kit vessel carefully, to prevent breakage of the thermometer.
 - PRESS the stopper assembly into the vessel to achieve a good seal.
- USE the J405 instrument to verify that the outside of the vessel is not contaminated and the mercury vapor emission level, if any, is below the OSHA TLV for mercury.
- ALLOW the kit to adjust to room temperature for at least two (2) hours before using.
 - The temperature range for the test is 16-24 °C. Avoid temperature fluctuations.



CAUTION:

Do not use the FTK vessel as a portable container. If the vessel is upset or greatly agitated, mercury droplets will cling to the thermometer stem, the rubber stopper, the mouth of the vessel and the needle guide.



Replacing Mercury

An oxide coating will form on the drop of mercury and will cause lower readings in your testing. Gently swirl the vessel to disturb the outer oxidized surface of the droplet. If this does not restore higher readings, it may be necessary to replace the mercury.

- Carefully remove the stopper assembly from the FTK vessel.



CAUTION:

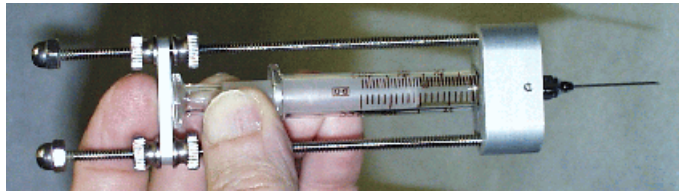
BE SURE NEEDLE GUIDE IS FREE OF LIQUID MERCURY.



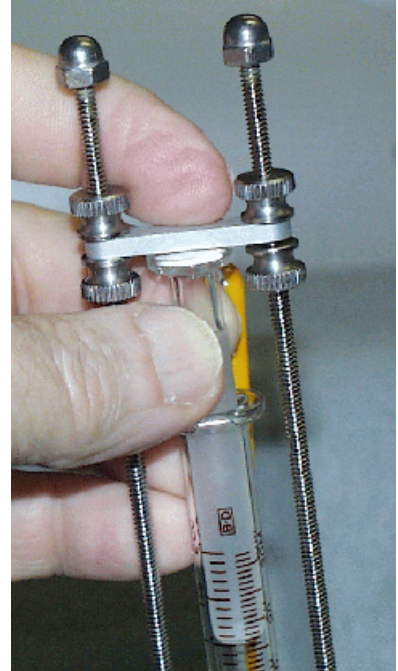
- Replace the oxidized mercury with approximately ½ cc fresh mercury.
(AZI P/N A2600-0904)
 - Do NOT use the syringe for measuring liquid mercury. Dispose of oxidized mercury properly.
- Reinstall the stopper assembly.

Syringe Technique

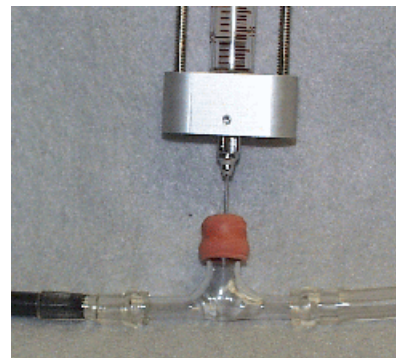
- Pull and hold the syringe plunger against the bar-stop.
- Verify that the black mark on the syringe plunger aligns with the 1cc mark on the syringe barrel.
 - If it does not, the holder assembly must be adjusted. Call AZI customer service at 602-470-1414 or 800-528-7411 for assistance.
- Insert the needle into the needle-guide of the bottle stopper.



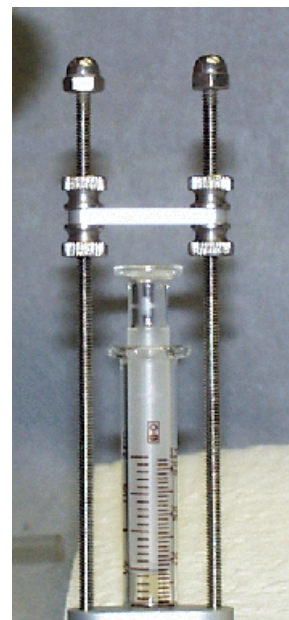
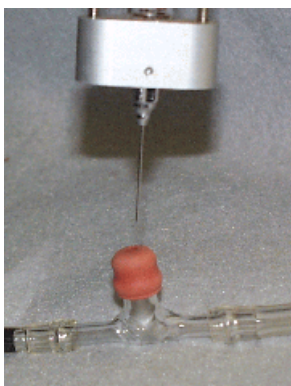
- Operate the plunger two or three times to pump mercury vapor into the syringe. On the final stroke, pull and hold the plunger against the bar-stop.
- Holding the plunger against the bar-stop, remove the syringe from the bottle and move it to the septum attached to the instrument intake.



- Continue to hold the plunger against the bar-stop and insert the syringe needle into the septum.
- Press the SAMPLE button on the instrument, and “Sampling” and “Purging” will appear on the J405 display.



- When “Purging” disappears from the display, release the plunger and allow gravity to feed the mercury vapor into the airstream. If the plunger stops, gently press it completely closed.
- Remove the syringe needle from the septum.



Functional Test Procedure

NOTE: Perform the functional test ONLY after sensor regeneration.

- Allow the FTK vessel to remain stable at room temperature for at least 2 hours.
 - The temperature range for the test is 16 °C- 24 °C.
 - Temperature fluctuations during the test procedure will produce erratic results.
- Replace the .25” fritware.
 - Refer to page 33 for instructions.
- Replace the septum on the septum holder assembly.
- Plug the tubing adapter end of the septum assembly firmly into the instrument's intake.
- Attach a Zero Air Filter to the septum assembly.
- Press power ON.
- Take 3 samples.
 - If the average meter reading is greater than 2 $\mu\text{g}/\text{m}^3$, stop here. The instrument may be contaminated. See **J405 TROUBLESHOOTING** on page 38.
 - If the average meter reading is less than 2 $\mu\text{g}/\text{m}^3$, continue to the next step.
- Note the temperature of the vessel.
- Press the SAMPLE button, and “Sampling” and “Purging” will appear on the instrument display.
- Wait 2 seconds and **when “Purging” disappears from the display**, inject 1 cc of mercury vapor according to the syringe technique described on page 59. Be sure all mercury vapor has been injected before the solenoid closes.



CAUTION:
Carefully follow these instructions to minimize error.



- Record the meter reading.

- Repeat the instructions for mercury injection three more times.
 - The readings obtained for the last three 1cc injections should be within $\pm 5\%$ of each other.
- Refer to the J405 FTK Instrument Response Chart, below, for the acceptable range.
 - The average of the last three readings should fall within the range shown on the chart.

If the average is within range, the JEROME® J405 is functioning properly.

- If the last three readings are not within $\pm 5\%$ of each other,
 - Perform sensor regeneration. (Refer to page **23** for the complete sensor regeneration procedure).
 - Wait 1 hour before proceeding to the next step.
 - Repeat the mercury injection test procedure.
 - If the average of the last three readings is still not within range, refer to the section on Functional Test Troubleshooting below.

J405 FTK Instrument Response Chart

Temperature in °C	Digital Meter Response ($\mu\text{g}/\text{m}^3$)
16	91 to 123
17	100 to 135
18	108 to 146
19	118 to 159
20	129 to 174
21	138 to 187
22	151 to 204
23	164 to 222
24	177 to 240

Functional Test Troubleshooting

If you do not achieve good results with the functional test procedure, check the following:

Results	Solution
Typically too high	Ensure the FTK vessel temperature is stable.
Too Low	Be sure to inject the Hg vapor ONLY after “Purging” disappears from the display (approximately 2 seconds after SAMPLE is pressed).
	Ensure there is no oxidation on the mercury drop in the vessel. Gently swirl the mercury drop in the vessel. Replace if necessary.
	Ensure the instrument’s intake is not blocked with foreign matter. Check flow with a flow meter.
	Ensure syringe is calibrated to 1cc. Use a new syringe needle. Straighten or replace crimped or blocked internal tubing.

If you find the above does not solve your problem, please call AZI Customer Service at 800-528-7411 or 602-470-1414.

12. WARRANTY

Arizona Instrument LLC (seller) warrants to buyer that Jerome® products delivered pursuant to this agreement shall, at the time of delivery, and for a period of one (1) year thereafter (the Internal Battery Pack, where applicable, is warranted for a period of ninety [90] days only), be free from defects in material or workmanship and shall conform to seller's specifications or such other specifications as seller has agreed to in writing. Seller's obligations with respect to claims under this warranty shall be limited, at seller's option, either to the replacement of defective or non-conforming product or to an appropriate credit for the purchase price thereof subject to the provisions of seller's Warranty Policy as amended from time to time, said Policy being incorporated herein by reference.

Returned products under warranty claims will be shipped to seller's plant by buyer at buyer's expense and shall be accompanied by a statement of the reason for the return and an approved Return Material Authorization Number issued by seller. Buyer remains responsible for payment for products not accepted for warranty adjustment, handling costs, and freight costs associated therewith.

Notwithstanding the foregoing, no warranty shall be enforceable in the event that product has been subjected to environmental or stress testing by buyer or any third party without written approval of seller prior to such testing. Further, no warranty shall be enforceable if the alleged defect is found to have occurred because of misuse, neglect, improper installation, repair, alteration, accident, or improper return handling procedure by buyer.

Discontinued product is warranted only for a credit or replacement at seller's option.

THE EXPRESS WARRANTIES GRANTED ABOVE SHALL EXTEND DIRECTLY TO BUYER AND NOT TO BUYER'S CUSTOMERS, AGENTS, OR REPRESENTATIVES AND, EXCEPT FOR WARRANTY OF TITLE, IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, SUCH OTHER WARRANTIES BEING SPECIFICALLY DISCLAIMED BY SELLER. IN NO EVENT SHALL EITHER PARTY'S LIABILITY FOR ANY BREACH OR ALLEGED BREACH OF THIS AGREEMENT EXCEED THE TOTAL EXTENDED PRICE OR PRICES SHOWN ON UNFILLED ORDERS, NOR SHALL EITHER PARTY BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM BREACH OR ALLEGED BREACH.

Notwithstanding the foregoing, if any product covered by order(s) placed hereunder is designated as "developmental," "prototype" or "experimental," no warranty whatsoever except a warranty of title to component materials, will be applicable thereto and buyer shall indemnify seller for any claims for liability asserted seller in connection therewith.

The foregoing state the entire liability of seller in connection with products supplied hereunder.

TRADEMARK AND COPYRIGHT PROTECTION

Jerome[®], Arizona Instrument[®], AZI[®] and the stylized AZI are all registered trademarks of Arizona Instrument LLC.

Instrument firmware is copyright protected.
All specifications subject to change without notice.

© Copyright 2006-2014 Arizona Instrument LLC. All Rights Reserved.

Sofnolime[™] is a trademark of Molecular Products Limited
Resisorb[®] is a registered trademark of Avantor Performance Materials.
Tygon[®] is a registered trademark of Saint-Gobain Performance Plastics Corporation.
Windows[®] is a registered trademark of Microsoft Corporation in the United States and other countries.

Arizona Instrument LLC **Jerome[®] J405 Mercury Vapor Analyzer Operation Manual** **Part Number 700-0099-L**

If you have any questions regarding the operation of this instrument, please call our toll free number (800) 528-7411. Internationally, call (602) 470-1414 or fax (480) 804-0656.

Arizona Instrument LLC
3375 N Delaware Street
Chandler, AZ 85225

(800) 528-7411
(602) 470-1414
Fax (480) 804-0656
<http://www.azic.com>
email:
azi@azic.com - General
intl@azic.com - International
support@azic.com - Customer Support

